Programming Guide

RIGOL

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DM3058 Digital Multimeter

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Summary

This manual provides the guidance for remote control programming of DM3058 digital multimeter. Users can carry on remote control to a multimeter or do the further development according to this manual. We believe that this manual's readers have read the detailed **RIGOL** DM3058 multimeter user guide, and been familiar with the **RIGOL** DM3058 multimeter's operation.

The manual contains seven chapters:

Chapter 1 Generalize the methods of using commands;

Chapter 2 Introduce the common commands includes IEEE488 commands and Status commands;

Chapter 3 Introduce the detailed commands according to the functions of **RIGOL** DM3058 series digital multimeter;

Chapter 4 Introduce the detailed Fluke commands that **RIGOL** DM3058 series digital multimeter are compatible with according to the functions;

Chapter 5 Introduce the detailed Agilent commands that **RIGOL** DM3058 series digital multimeter are compatible with according to the functions;

Chapter 6 List other commands that **RIGOL** DM3058 series digital multimeter are compatible with in the format of table; and also list the commands that **RIGOL** DM3058 are not compatible with for querying conveniently.

Chapter 7 The application examples of **RIGOL** DM3058 series digital multimeter commands.

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Chapter 1 Introduction

This chapter gives you a guidance in how to operate **RIGOL** DM3058 digital multimeter correctly based on Remote control programming and to achieve a long-distance measuring operation, which mainly includes:

- Programming Introduction
- Symbol Instruction
- Parameter Types
- Commands Introduction

Programming Introduction

This part introduces the basic programming operations. These programming commands provide a medium for remote control to a multimeter.

The Basic operations that you can do with a computer and a multimeter include:

- Setup the multimeter.
- Measure.
- Acquire data (equipment working condition or measuring results) from a multimeter.

A computer can communicate with a multimeter by sending or receiving messages over an I/O port, such as USB, GPIB port or a RS-232 port. The commands appear as ASCII strings embedded inside the output statements of a "host" language available on your computer, so you can control it easily and do the secondary development. About the connection methods of communication interface please refer to the user guide.

Symbol Instruction

1. Colon :

Commands usually begin with a colon (**:**). A colon (**:**) is used to separate a command keyword from a lower-level keyword. It shows the operation that a multimeter will implement. **RIGOL** commands begin with (**:**).

2. Blank Space □

A Blank space is used to separate commands from the program data. If your command does not need any program data, the blank space is not needed.

3. Interrogation ?

A query is formed by adding an interrogation (?) at the end of the commands. The query commands usually include different data, and both of them usually divided by a space □. But some commands don't include data.

4. Braces { }

When several elements separated by a vertical line (|) are enclosed by braces, { }, only one element may be selected. For example, {ON | OFF} indicates that only ON or OFF may be selected, not both.

5. Triangle Brackets < >

A item enclosed in < > should be replaced by a numerical value or character string.

6. Square brackets [ ]

Some key words of parameter or command tree are enclosed by square bracket ([ ]), which indicates that those parameters are optional or could be ignore. If no parameter is set, the system will select a default. For example, CONFigure [:VOLTage][:DC]□[{<range>|AUTO|MIN|MAX|DEF} [,{<resolution>|MIN|MAX |DEF}]]. In this command, there are many square brackets, if you set the parameter as default, the command could be abbreviate as CONFigure.

Parameter Types

1. Consecutive Integer Parameter

The parameters can be any integer only in effective range. Note that do not set the parameters for decimal format, or else abnormal. For example, setting screen brightness command **":system:display:bright"**, the parameter range is from 0 to 255.

2. Consecutive Real Number Parameter

In effective value range, the parameters can be random value according to precision (usually the default precision takes six effective digits behind decimal point). For example, setting NULL offset command **":calculate:REL:offset"**, the parameters meet the range of the real number Table 3-10 indicated.

3. Discrete Parameters

The parameters can only be the cited value. For example, setting AC voltage measuring range command **":measure:voltage:AC"**, the parameter can only be 0, 1, 2 or 3, but not other values.

4. Boolean Parameters

The parameters can only be ON or OFF. For example, setting beeper state command **":system:beeper:state"**, the parameter can only be ON or OFF.

5. ASCII Character String

The parameter should be composed of ASCII character string. For example, setting querying IP address command **":utility:interface:LAN:ip"**, the parameter can be a self-defined character string.

Commands Introduction

To meet the needs from different users, DM3058 not only provide **RIGOL** commands, but also provide another two commands that are compatible with the related products.

- **RIGOL** DM3058 commands
- The commands compatible with Agilent
- The commands compatible with Fluke

Send **CMDSET** command to switch the commands type. For the usage please see the follows:

Command Format:

CMDSET□{RIGOL|AGILENT|FULUKE}

CMDSET?

Function:

The command sets and queries the type of commands .

- The first command parameters could be RIGOL，AGILENT and FLUKE, and which separately means switch to corresponding commands.
- The second command queries the current commands and returns the name of commands.

Remarks:

If you don't want to set the type of commands via this command when starting machine, the default will be **RIGOL**.

Chapter 2 General Commands System

General Commands System applied to both DM3058 Commands and its compatible commands of Fluke and Agilent, which mainly includes:

- IEEE488 Commands
- Status Commands
- Error Commands

IEEE488 Commands

The commands query the equipment state or perform some basic operations which mainly include:

- *IDN?
- *RST
- *ESE
- *ESR?
- *PSC
- *SRE
- *STB?
- *CLS
- *OPC
- *RCL
- *SAV

1. *IDN?

Command Format:
*IDN?

Function:
The command queries equipment ID.

Return Format:
The query returns the character string that shows the equipment ID within 35 characters at least.

2. *RST

Command Format:
*RST

Function:
The command resets the equipment state to the factory default.

3. *ESE

Command Format:
*ESE□<enable_value>
*ESE?

Function:
The command sets or queries the enable value of Event Status Register (ESR).

Explanations:
*ESE□<value>: Set the enable value of Event Status Register.
*ESE?: Query the enable value of Event Status Register.
<enable_value>: The range is from 0 to 189.

Return Format:
The query returns the enable value of ESR.

4. *ESR?

Command Format:
*ESR?

Function:
The command queries the event value of Event Status Register (ESR).

Return Format:
The query returns the event value of ESR.

5. *PSC

Command Format:
*PSC□{0|1}
*PSC?

Function:
The command sets or queries the value of "power-on status clear (PSC)".

Explanations:
*PSC□{0|1}: Enable or disable the clear operation of register as soon as the instrument is power-on. "*PSC 0" indicates disable, that is the enable value of every register keeps the value before power-off; "*PSC 1" indicates enabler, that is all the enable values are reset.
*PSC?: Query the value of "power-on status clear".

Return Format:
The querry returns 0 or 1. "0" denotes that the register will not been cleared when power-on; "1" denotes the register will be cleared when power-on.

6. *SRE

Command Format:
*SRE□<enable_value>
*SRE?

Function:
The command sets or queries the enable value of Status Byte Register (STB).

Explanations:
*SRE□<enable_value>: Set the enable value of STB.
*SRE?: Query the enable value of STB.
<enable_value>: The range is from 0 to 188.

Return Format:
The query returns the enable value of STB.

7. *STB?

Command Format:
*STB?

Function:
The command queries the condition value of Status Byte Register (STB).

Return Format:
The query returns the condition value of STB.

8. *CLS

Command Format:
*CLS

Function:
The command clears the value from all the Event Registers and the Error Queue information.

9. *OPC

Command Format:
*OPC
*OPC?

Function:

The command sets the "Operation Complete" (zero bit) from Event Status Register as 1 after finish current operation.

*OPC?: Query whether the current operation is finished or not.

Return Format:

The query returns "1" , which denotes current operation has finished.

10. *RCL

Command Format:

*RCL□{1|2|3|4|5|6|7|8|9|10}

Function:

The command recovers the current status of instrument to the status of selected location. If the location is empty or can not been detected, an error may be occur. Totally 10 locations are provided to recover.

11. *SAV

Command Format:

*SAV□{1|2|3|4|5|6|7|8|9|10}

Function:

The command saves current instrument status to the selected location. The information have been saved in this location before will be covered (no error). Totally 10 locations are provided for users to save their status information.

Status Commands

These commands set or query the related data from both Questionable Status Register and Operation Status Register which mainly include:

- [:]status:operation:condition?
- [:]status:operation:enable
- [:]status:operation[:event]?
- [:]status:preset
- [:]status:questionable:condition?
- [:]status:questionable:enable
- [:]status:questionable[:event]?

The principle of Status Register is shown in Figure 2-1, which contains Questionable Status Register, Operation Status Register, Event Status Register and Status Byte Register as well as Output Buffer and Error Queue. The status commands set or query the Questionable Status Register and Operation Status Register in Status Register.
About the detailed operation of IEEE488 commands to Event Status Register and Status Byte Register as well as Output Queue and Error Queue, please refer to IEEE488 commands in Chapter2.

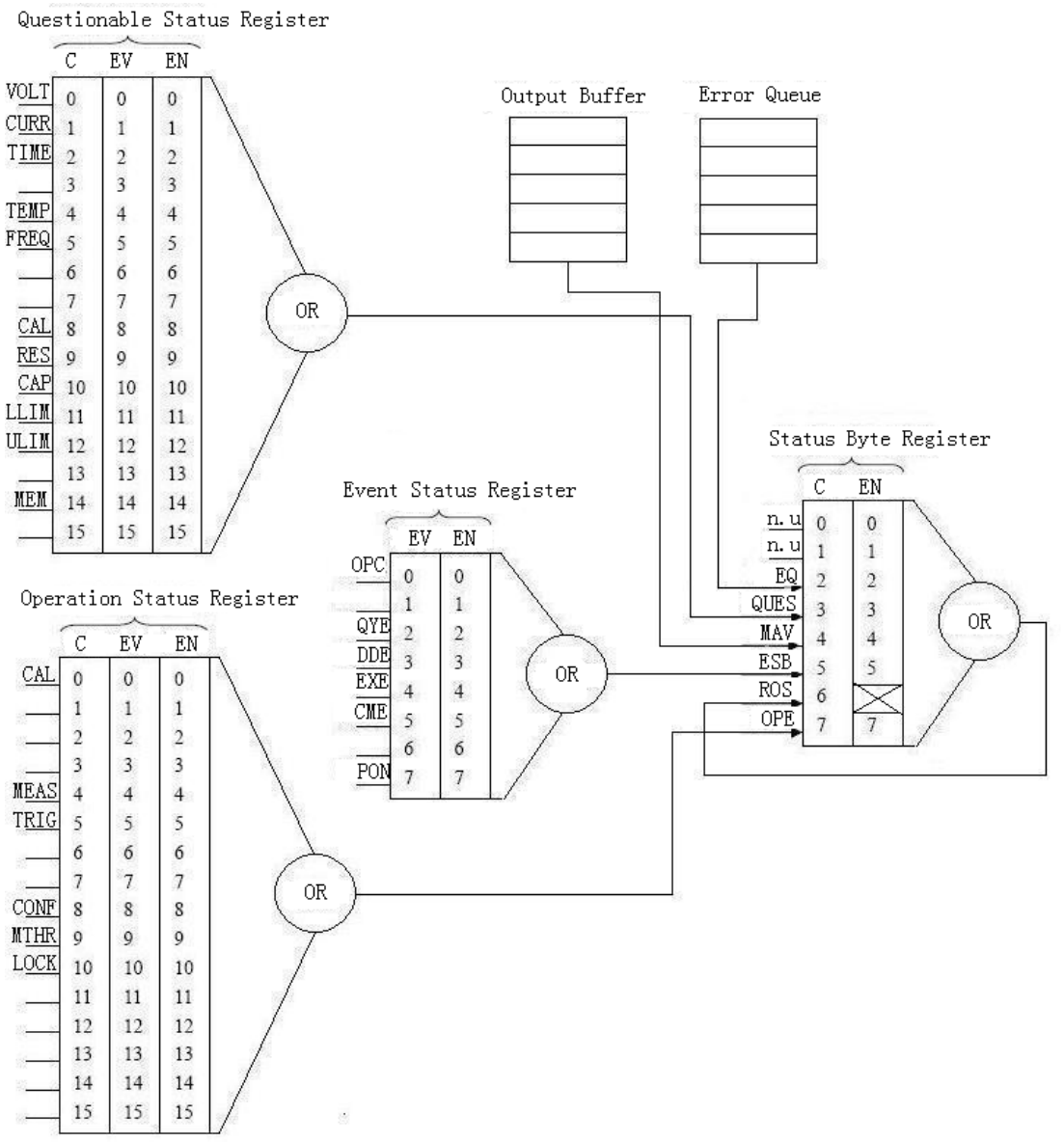

Figure 2-1 Schematic diagram of Status Register

1. [:]status:operation:condition?

Command Format:

[:]status:operation:condition?

Function:

The command queries the state value of Condition Register from Operation Status Register.

Return Format:

The query returns the state value of Condition Register from Operation Status Register.

2. [:]status:operation:enable

Command Format:

[:]status:operation:enable□<enable_value>

[:]status:operation:enable?

Function:

The command sets or queries the value of Enable Register from Operation Status Register.

Explanation:

[:]status:operation:enable□<enable_value>: Set the value of Enable Register from Operation Status Register.

<enable_value>: The range is from 0 to 1841.

[:]status:operation:enable?: Query the value of Enable Register from Operation Status Register.

Return Format:

The query returns the value of Enable Register from Operation Status Register.

3. [:]status:operation[:event]?

Command Format:

[:]status:operation[:event]?

Function:
The command queries the value of Event Register from Operation Status Register.

Return Format:
The query returns the value of Event Register from Operation Status Register.

4. [:]status:preset

Command Format:
[:]status:preset

Function:
The command clears the value of Enable Register from Operation Status Register and Questionable Status Register.

5. [:]status:questionable:condition?

Command Format:
[:]status:questionable:condition?

Function:
The command queries the value of Condition Register from Questionable Status Register.

Return Format:
The query returns the value of Condition Register from Questionable Status Register.

6. [:]status:questionable:enable

Command Format:
[:]status:questionable:enable□<enable_value>
[:]status:questionable:enable?

Function:
The command queries the value of Enable Register from Questionable Status

Register.

Explanation:

[:]status:questionable:enable <enable_value>: Set the value of Enable Register from Questionable Status Register between 0 and 24375.

[:]status:questionable:enable?: Query the value of Enable Register from Questionable Status Register

Return Format:

The query returns the value of Enable Register from Questionable Status Register

7. [:]status:questionable[:event]?

Command Format:

[:]status:questionable[:event]?

Function:

The command queries the value of Event Register from Questionable Status Register.

Return Format:

The query returns the value of Event Register from Questionable Status Register.

Error Commands

The commands query the error message to the instrument based on " first-in first-out " and return a error message every time, which mainly include:

- system:error?

1. system:error?

Command Format:

system:error?

Function:

The command queries the error message in error queue.

Return Format:

The query returns the character string of error message.

Chapter 3 DM3058 Commands System

In **RIGOL** DM3058 digital multimeter commands, all the parameters and the return values are ASCII characters. Besides, the input state is insensitive.

RIGOL DM3058 digital multimeter includes the following commands subsystems:

- Function Commands
- Measure Commands
- Rate Commands
- System Commands
- Utility Commands
- Trigger Commands
- Calculate Commands
- Double-Display Commands

Function Commands

The commands sets the basic measuring functions which equal to the related selector button of Measure Function in front panel.

Which mainly include:

- :function?
- :function:voltage:DC
- :function:voltage:AC
- :function:current:DC
- :function:current:AC
- :function:resistance
- :function:fresistance
- :function:frequency
- :function:period
- :function:continuity
- :function:diode
- :function:capacitance

1. :function?

Command Format:
:function?

Function:
The command queries the current measuring function. If in Dual Display mode, queries the function of main display.

Return Format:
The query returns the current DM3058 measuring function's shortening. The possible return values are: DCV, ACV, DCI, ACI, RESISTANCE, CAPACITANCE, CONTINUITY, FRESISTANCE, DIODE, FREQUENCY, PERIOD.

2. :function:voltage:DC

Command Format:
:function:voltage:DC

Function:
The command enables DC voltage measuring function.

Explanations:
In ":function?", this function is corresponding to the return value "DCV".

3. :function:voltage:AC

Command Format:
:function:voltage:AC

Function:
The command enables AC voltage measuring function.

Explanation:
In ":function?", this function is corresponding to the return value "ACV".

4. :function:current:DC

Command Format:
:function:current:DC

Function:
The command enables DC current measuring function.

Explanation:
In ":function?", this function is corresponding to the return value "DCI".

5. :function:current:AC

Command Format:
:function:current:AC

Function:
The command enables AC current measuring function.

Explanation:
In ":function?", this function is corresponding to the return value "ACI".

6. :function:resistance

Command Format:
:function:resistance

Function:
The command enables 2-wire resistance measuring function.

Explanation:
In ":function?", this function is corresponding to the return value "RESISTANCE".

7. :function:fresistance

Command Format:

:function:fresistance

Function:
The command enables 4-wire resistance measuring function.

Explanation:
In ":function?", this function is corresponding to the return value "FRESISTANCE".

8. :function:frequency

Command Format:
:function:frequency

Function:
The command enables frequency measuring function.

Explanation:
In ":function?", this function is corresponding to the return value "FREQUENCY".

9. :function:period

Command Format:
:function:period

Function:
The command enables period measuring function.

Explanation:
In ":function?", this function is corresponding to the return value "PERIOD".

10. :function:continuity

Command Format:
:function:continuity

Function:

The command enables continuity measuring function.

Explanation:
In ":function?", this function is corresponding to the return value "CONTINUITY".

11. :function:diode

Command Format:
:function:diode

Function:
The command enables diode measuring function.

Explanation:
In ":function?", this function is corresponding to the return value "DIODE".

12. :function:capacitance

Command Format:
:function:capacitance

Function:
The command enables capacitance measuring function.

Explanation:
In ":function?", this function is corresponding to the return value "CAPACITANCE".

Measure Commands

The commands are used to set measuring function further which equals to select measuring function buttons in DM3058 front panel.

Which mainly include:

- :measure?
- :measure
- :measure:voltage:DC?
- :measure:voltage:DC
- :measure:voltage:DC:range?
- :measure:voltage:DC:impedance
- :measure:voltage:DC:filter:state
- :measure:voltage:AC?
- :measure:voltage:AC
- :measure:voltage:AC:range?
- :measure:current:DC?
- :measure:current:DC
- :measure:current:DC:range?
- :measure:current:AC?
- :measure:current:AC
- :measure:current:AC:range?
- :measure:resistance?
- :measure:resistance
- :measure:resistance:range?
- :measure:fresistance?
- :measure:fresistance
- :measure:fresistance:range?
- :measure:frequency?
- :measure:frequency
- :measure:frequency:range?
- :measure:period?
- :measure:period
- :measure:period:range?
- :measure:continuity?
- :measure:continuity

- :measure:diode?
- :measure:capacitance?
- :measure:capacitance
- :measure:capacitance:range?

1. :measure?

Command Format:
:measure?

Function:
The command queries whether a new data is acquired in current trigger setting.

Return Format:
The query returns true or false. If "a new data is acquired" returns "ture", or else returns "false".

2. :measure

Command Format:
:measure□{AUTO|MANU}

Function:
The command sets measure mode as Auto or Manual.

Example:
Set measure mode as Manual:
:measure□MANU

3. :measure:voltage:DC?

Command Format:
:measure:voltage:DC?

Function:
The command queries DC voltage.

Explanation:
The command is invalid for Dual Display.

Return Format:
The query returns current DC voltage in the form of scientific notation, for

example: 8.492853e-05, unit is V.

4. :measure:voltage:DC

Command Format:

:measure:voltage:DC□{<range>|MIN|MAX|DEF}

Function:

The command sets the measuring range of DC voltage and resolution.

Parameters:

Name	Type	Range of Values	Default
<range>	discrete	{0|1|2|3|4}	0

Explanations:

To set the measuring range of DC voltage and the resolution at the same time.
The measure mode will be changed into manual when setting range.
For the reference ranges and resolutions please refer to table 3-1.

Table 3-1 The DC voltage range and the resolution

Parameter	Range	Resolution
0	200 mV	100 nV
1	2 V	1 μV
2	20 V	10 μV
3	200 V	100 μV
4	1000 V	1 mV
MIN	200 mV	100 nV
MAX	1000 V	1 mV
DEF	20 V	10 μV

Examples:

To set the measuring range of DC voltage as 200.0 V:
:measure:voltage:DC□3

To set the measuring range of DC voltage as minimum.
:measure:voltage:DC□MIN or :measure:voltage:DC□0

5. :measure:voltage:DC:range?

Command Format

:measure:voltage:DC:range?

Function:

The command queries the measuring range of DC voltage.

Explanation:

Please make sure the DCV function must has been set at least one time before using this command.

Return Format:

The query returns the parameter related to current range : 0, 1, 2, 3 or 4 (see Table 3-1).

6. :measure:voltage:DC:impedance

Command Format:

:measure:voltage:DC:impedance?
:measure:voltage:DC:impedance□{10M|10G}

Function:

The command queries and sets DC voltage impedance.

Explanations:

:measure:voltage:DC:impedance?: Return 10M or 10G (>10 G).
:measure:voltage:DC:impedance□{10M|10G}: Set the DC voltage impedance as 10 MΩ or >10 GΩ.
Remarks: ">10G" is available only when the range of DC is in 200 mV or 2 V.

Example:

To set the DC voltage impedance as 10 GΩ:
:measure:voltage:DC:impedance□10G

7. :measure:voltage:DC:filter:state

Command Format:
:measure:voltage:DC:filter:state?
:measure:voltage:DC:filter:state□{ON|OFF}

Function:
The command queries and sets the switch state of DC filter.

Explanations:
:measure:voltage:DC:filter:state?: Query the switch state of DC filter.
:measure:voltage:DC:filter:state□{ON|OFF}: Set the switch state of DC filter.

Return Format:
The query return the switch state of DC filter: ON or OFF that denotes turning DC filter on or off.

Example:
To turn on DC filter:
:measure:voltage:DC:filter:state□ON

8. :measure:voltage:AC?

Command Format:
:measure:voltage:AC?

Function:
The command queries AC voltage.

Explanation:
This command is invalide for Dual Display.

Return Format:
The query returns the current AC voltage in the form of 3.941713e-01, unit is V.

9. :measure:voltage:AC

Command Format:

:measure:voltage:AC□{<range>|MIN|MAX|DEF}

Function:

The command sets the measuring range of AC voltage.

Parameters:

Name	Type	Range of Values	Default
<range>	discrete	{0|1|2|3|4}	2

Explanations:

The table 3-2 lists the parameters and the ranges.

Table 3-2 The range of AC voltage

Parameter	Range
0	200 mV
1	2.0 V
2	20.0 V
3	200.0 V
4	750.0 V
MIN	200 mV
MAX	750 V
DEF	20.0 V

Example:

To set the measuring range of AC voltage as 750.0 V:

:measure:voltage:AC□MAX or :measure:voltage:AC□4

10. :measure:voltage:AC:range?

Command Format:

:measure:voltage:AC:range?

Function:

The command queries the measuring range of AC voltage.

Return Format:

The query returns the parameter related to current range: 0, 1, 2, 3 or 4 (see

Table 3-2).

11. :measure:current:DC?

Command Format:
:measure:current:DC?

Function:
The command queries DC current.

Explanations:
This command is invalide for dual display

Return Format;
The query returns the DC current in the form of 9.674418e-05, and unit is A.

12. :measure:current:DC

Command Format:
:measure:current:DC□{<range>|MIN|MAX|DEF}

Function:
The command sets the measuring range of DC current and resolution.

Parameters:

Name	Type	Range of Value	Default
< range >	discrete	{0|1|2|3|4|5 }	0

Explanations:
To set the measuring range of DC current and the resolution at the same time.
The measure mode will be changed into manual when setting range.
The table 3-3 indicates the current ranges and the resolutions.

Table 3-3 The DC current ranges and their resolutions

Parameter	Current	Resolution
0	200 μA	1 nA
1	2 mA	10 nA
2	20 mA	100 nA
3	200 mA	1 μA
4	2 A	10 μA
5	10 A	100 μA
MIN	200 μA	1 nA
MAX	10 A	100 μA
DEF	200 mA	1 μA

Explanation:

To set the measuring range of DC current as 10.0 A:

:measure:current:DC□MAX or :measure:current:DC□5

13. :measure:current:DC:range?

Command Format:

:measure:current:DC:range?

Function:

The command queries the measuring range of DC current.

Return Format:

The query returns the parameter related to current range : 0, 1, 2, 3 or 4 (see Table 3-3).

14. :measure:current:AC?

Command Format:

:measure:current:AC?

Function:

The command queries AC current.

Explanation:
This command is invalide for Dual Display

Return Format:
The query returns the AC current in the form of 9.293791e-05, and unit is A.

15. :measure:current:AC

Command Format:
:measure:current:AC□{<range>|MIN|MAX|DEF}

Function:
The command sets the measuring range of AC current.

Parameters:

Name	Type	Range of Values	Default
<range>	discrete	{0|1|2|3}	1

Explanations:
:measure:current:AC?: Query the measuring range of AC current. Before sending the command, please turn on AC current measuring function.
:measure:current:AC□<value>: Set the measuring range of AC current. At the same time the manual mode is set.
The table 3-4 indicates the parameters and their meanings.

Table 3-4 The AC current parameters and their meanings

Parameter	Range
0	20 mA
1	200 mA
2	2 A
3	10 A
MIN	20 mA
MAX	10 A
DEF	200 mA

Example:
To set the measuring range of AC current as 10.0 A:

:measure:current:AC□MAX or :measure:current:AC□3

16. :measure:current:AC:range?

Command Format:
:measure:current:AC:range?

Function:
The command queries AC current range.

Explanation:
Before sending the command, please enable AC current measuring function.

Return Format:
The query returns the parameter related to current range : 0, 1, 2 or 3 (see Table 3-4).

17. :measure:resistance?

Command Format:
:measure:resistance?

Function:
The commad queries 2-wire resistance.

Explanation:
This command is invalide for Dual Display.

Return Format:
The query returns the current resistance in the form of 8.366031e-05, and unit is Ω.

18. :measure:resistance

Command Format:
:measure:resistance□{<range>|MIN|MAX|DEF}

Function:

The command sets the measuring range of 2-wire resistance.

Parameters:

Name	Type	Range of Values	Default
<range>	discrete	{0|1|2|3|4|5|6}	3

Explanations:

The table 3-5 indicates the parameters and the range.

Table 3-5 The two circuits resistance ranges

Parameter	Range
0	200 Ω
1	2 KΩ
2	20 KΩ
3	200 KΩ
4	1 MΩ
5	10 MΩ
6	100 MΩ
MAX	100 MΩ
MIN	200 Ω
DEF	200 KΩ

Example:

To set the measuring range of 2-wire resistance as 200.0 Ω:

:measure:resistance□MIN or :measure:resistance□0

19. :measure:resistance:range?

Command Format:

:measure:resistance:range?

Function:

The command queries the measuring range of 2-wire resistance.

Return Format:

The query returns the parameter related to current range : 0, 1, 2, 3, 4, 5 or 6

(see Table 3-5).

20. :measure:fresistance?

Command Format:
:measure:fresistance?

Function:
The command queries 4-wire resistance.

Explanation:
This command is invalide for Dual Display

Return Format:
The query returns the current 4-wire resistsnce in the form of 8.822946e-05, and unit is Ω.

21. :measure:fresistance

Command Format:
:measure:fresistance□{<range>|MIN|MAX|DEF}

Function:
The command sets the measuring range of 4-wire resistance.

Parameters:

Name	Type	Range of Values	Default
<range>	discrete	{0|1|2|3|4|5|6 }	3

Explanation:
The Table 3-5 indicates the parameters and their meanings.

Example:
Set the measuring range of 4-wire resistance as 200.0 Ω:
:measure:fresistance□MIN or :measure:fresistance□0

22. :measure:fresistance:range?

Command Format:
:measure:fresistance:range?

Function:
The command queries the measuring range of 4-wire resistance.

Return Format:
The query returns the parameter related to current range : 0, 1, 2, 3, 4, 5 or 6 (see Table 3-5).

23. :measure:frequency?

Command Format:
:measure:frequency?

Function:
The command queries frequency.

Explanation:
The range of frequency is 20 Hz~1 MHz. This command is invalide for Dual Display

Return Format:
The query returns the current frequency in the form of 8.485240e-05, and unit is Hz.

24. :measure:frequency

Command Format:
:measure:frequency□{<range>|MIN|MAX|DEF}

Function:
The command sets the measuring range of input voltage in frequency measurement.

Parameters:

Name	Type	Range of Value	Default
<range>	discrete	{0|1|2|3|4}	2

Explanations:

The frequency range is 20 Hz~1 MHz.

The Table 3-2 indicates the parameters and their ranges.

Example:

To set the measuring range of input voltage as 20 V:

:measure:frequency□DEF

25. :measure:frequency:range?

Command Format:

:measure:frequency:range?

Function:

The command queries the measuring range of AC voltage in frequency measurement.

Explanations:

The range is the same as the measuring range of DC voltage . See Table 3-2.

Return Format:

The query returns the parameter related to current range: 0, 1, 2, 3 or 4 (see Table 3-2).

26. :measure:period?

Command Format:

:measure:period?

Function:

The command queries period.

Explanation:
This command is invalide for Dual Display.

Return Format:
The query returns the current period in the form of 9.185433e-05, and the unit is s.

27. :measure:period

Command Format:
:measure:period□{<range>|MIN|MAX|DEF}

Function:
The command sets the measuring range of input voltage in period measurement.

Parameters:

Name	Type	Range of Values	Default
<range >	discrete	{0|1|2|3|4}	2

Explanations:
The period range is 1 us~50 ms.
The Table 3-2 indicates the parameters and their ranges.

Example:
To set the measuring range of input voltage as 20 V:
:measure:period□DEF or :measure:period□2

28. :measure:period:range?

Command Format:
:measure:period:range?

Function:
The command queries the measuring range of AC voltage in period measurement.

Explanations:

The range is the same as the measuring range of AC voltage. See Table 3-2.

Return Format:

The query returns the parameter related to current range: 0, 1, 2, 3 or 4 (see Table 3-2).

29. :measure:continuity?

Command Format:

:measure:continuity?

Function:

The command quries resistance in the state of short circuit.

Return Format:

The query returns the current resistance in the form of 8.888000e+03, and unit is Ω.

30. :measure:continuity

Command Format:

:measure:continuity□{<range>|MIN|MAX|DEF}

Function:

The command sets the limit resistance in short circurt measurement.

Parameters:

Name	Type	Range of Values	Default
<range>	Consecutive Integer	1 Ω~2000 Ω	10

Explanations:

The range is a consecutive Integer among 1 Ω~2000 Ω.

The default resistance is 10 Ω. MAX denotes the maximum is 2000 Ω. MIN denotes the minimum is 1 Ω. DEF denotes the default is 10 Ω.

Example:
To set the limit resistance as 1 kΩ:
:measure:continuity□1000

31. :measure:diode?

Command Format:
:measure:diode?

Function:
The command queries diode voltage at both ends.

Explanation:
In measuring diode, the beep condition is 0.1 V≤$V_{measured}$≤2.4 V.

Return Format:
The query returns the current diode voltage in the form of 4.492510e-04, and unit is V.

32. :measure:capacitance?

Command Format:
:measure:capacitance?

Function:
The command queries capacitance.

Explanation:
This command is invalide for Dual Display.

Return Format:
The query returns the current capacitance in the form of 8.889030e-05, and unit is F.

33. :measure:capacitance

Command Format:

:measure:capacitance□{<range>|MIN|MAX|DEF}

Function:

The command sets the measuring range of capacitance.

Parameters:

Name	Type	Range of Values	Default
<range>	discrete	{0|1|2|3|4|5 }	2

Explanations:

The table 3-6 indicates the parameters and their ranges.

Table 3-6 The capacitance parameters and their ranges

Parameter	Range
0	2 nF
1	20 nF
2	200 nF
3	2 μF
4	20 μF
5	200 μF
MIN	2 nF
MAX	200 μF
DEF	200 nF

Example:

To set the measuring range of capacitance as 2 μF:

:measure: capacitance□3

34. :measure:capacitance:range?

Command Format:

:measure:capacitance:range?

Function:

The command queries the measuring range of capacitance.

Return Format:

The query returns the parameter related to current range: 0, 1, 2, 3, 4 or 5 (see Table 3-6).

Rate Commands

The commands sets the rate of various measuring funtion such as Slow measure, Medium measure and Fast measure which mainly include:

- :rate:voltage:DC
- :rate:voltage:AC
- :rate:current:DC
- :rate:current:AC
- :rate:resistance
- :rate:fresistance

1. :rate:voltage:DC

Command Format:

:rate:voltage:DC?

:rate:voltage:DC□{fast|medium|slow}

Function:

The command sets or queries the measuring rate of DC voltage.

Explanations:

:rate:voltage:DC?: Query current measuring rate of DC voltage. DCV function has to be enabled before execute this command.

:rate:voltage:DC□{fast|medium|slow}: Set current measuring rate of DC voltage. For the range and the explanation of parameters please refer to the following table:

Table 3-7 The range and explanation of parameters

Parameter	Explanation	Mark	Rate	Refresh rate
fast	Fast measure	F	120 reading/s	50 Hz
medium	Medium measure	M	20 reading/s	20 Hz
slow	Slow measure	S	2.5 reading/s	2.5 Hz

Return Format:

The query returns the parameter related to current measuring rate: fast, medium or slow.

Example:

Set the measuring rate of DC voltage as Medium.

:rate:voltage:DC□medium

2. :rate:voltage:AC

Command Format:

:rate:voltage:AC?

:rate:voltage:AC□{fast|medium|slow}

Function:

The command queries or sets the measuring rate of AC voltage.

Explanations:

:rate:voltage:AC?: Query current measuring rate of AC voltage. ACV function has to be enabled before execute this command.

:rate:voltage:AC□{fast|medium|slow}: Set current measuring rate of AC voltage. For the range and the explanation of parameters please refer to Table 3-7.

Return Format:

The query returns the parameter related to current measuring rate: fast, medium or slow.

Example:

Set the measuring rate of AC voltage as Medium.

:rate:voltage:AC□medium

3. :rate:current:DC

Command Format:

:rate:current:DC?

:rate:current:DC□{fast|medium|slow}

Function:

The command queries or sets the measuring rate of DC current.

Explanations:

:rate:current:DC?: Query current measuring rate of DC current, DCI function has to be enabled before execute this command.

:rate:current:DC□{fast|medium|slow}: Set current measuring rate of DC voltage. For the range and the explanation of parameters please refer to Table 3-7.

Return Format:

The query returns the parameter related to current measuring rate: fast, medium or slow.

Example:

Set the measuring rate of DC current as Medium.

:rate:current:DC□medium

4. :rate:current:AC

Command Format:

:rate:current:AC?

:rate:current:AC□{fast|medium|slow}

Function:

The command queries or sets the measuring rate of AC current.

Explanations:

:rate:current:AC?: Query current measuring rate of AC current, ACI function has to be enabled before execute this command.

:rate:current:AC□{fast|medium|slow}: Set current measuring rate of DC voltage. For the range and the explanation of parameters please refer to Table 3-7.

Return Format:

The query returns the parameter related to current measuring rate: fast, medium or slow.

Example:

Set the measuring rate of AC current as Medium.

:rate:current:AC□medium

5. :rate:resistance

Command Format:

:rate:resistance?

:rate:resistance□{fast|medium|slow}

Function:

The command queries or sets the measuring rate of 2-wire resistance.

Explanations:

:rate:resistance?: Query current measuring rate of 2-wire resistance. 2WR function has to be enabled before execute this command.

:rate:resistance□{fast|medium|slow}: Set current measruing rate of 2-wire resistance as Medium. For the range and explanation of parameters please refer

to Table 3-7.

Return Format:

The query returns the parameter related to current measuring rate: fast, medium or slow.

Example:

Set the measuring rate of 2-wire resistance as Medium.

:rate:resistance□medium

6. :rate:fresistance

Command Format:

:rate:fresistance?

:rate:fresistance□{fast|medium|slow}

Function:

The command queries or sets the measuring rate of 4-wire resistance.

Explanations:

:rate:fresistance?: Query current measuring rate of 4-wire resistance. 4WR function has to be enabled before exacute this command.

:rate:fresistance□{fast|medium|slow}: Set current measruing rate of 4-wire resistance as Medium. For the range and explanation of parameters please refer to Table 3-7.

Return Format:

The query returns the parameter related to current measuring rate: fast, medium or slow.

Example:

Set the measruing rate of 4-wire resistance as Medium.

:rate:fresistance□medium

System Commands

The commands set the system parameters.

Which mainly include:

- :system:beeper
- :system:beeper:state
- :system:configure:poweron
- :system:configure:default
- :system:language
- :system:format:decimal
- :system:format:separate
- :system:display:bright
- :system:display:contrast
- :system:display:invert

1. :system:beeper

Command Format:
:system:beeper

Function:
The command tests the beeper.

Explanations:
The command enables the beeper beep only one time when testing. Before sending this command, please do open the beeper.

2. :system:beeper:state

Command Format:
:system:beeper:state?
:system:beeper:state□{ON|OFF}

Function:
The command queries and sets the switch state of beeper .

Explanations:
:system:beeper:state?: Query whether the beeper is on.
:system:beeper:state□{ON|OFF}: Set the switch state of beeper. The parameter "ON" means turn on the beeper, "OFF" means turn off. If the beeper was off by using "OFF", ":system:beeper" is invalid when next test.

Return Format:
The query returns the beeper state. "ON" returns 1, or else returns 0.

Example:
To turn on the beeper:
:system:beeper:state□ON

3. :system:configure:poweron

Command Format:

:system:configure:poweron□{LAST|DEFAULT}

Function:
The command sets system parameters on power.

Explanations:
The command is used to set the system parameters as the last setting or the system default when powering on. "LAST" means to read the last setting, and "DEFAULT" means the system default.

4. :system:configure:default

Command Format:
:system:configure:default

Function:
The command sets system default.

5. :system:language

Command Format:
:system:language?
:system:language□{CHINESE|ENGLISH}

Function:
The command queries and sets the category of system language.

Explanations:
:system:language?: Query the category of system language
:system:language□{CHINESE|ENGLISH}: Set the category of system language . "CHINESE" means the system language is chinese, "ENGLISH" means english.

Return Format:
The query returns chinese or english, denoting respectively current system language is Chinese or English.

6. :system:format:decimal

Command Format:

:system:format:decimal?

:system:format:decimal□{COMMA | DOT}

Function:

The command queries and sets the format of radix point .

Explanations:

:system:format:decimal?: Query the format of radix point .

:system:format:decimal□{COMMA | DOT}: Set the format of radix point. "COMMA" means to use "," as a radix point, and at the same time the former "," is changed into ".". "DOT" means to use "." as a radix point, meanwhile the former "." is changed into ",".

Note: As it is easier to change the format of data separator by using this commond, so please do it carefully.

Return Format:

The query returns the current format of radix point: COMMA or DOT.

7. :system:format:separate

Command Format:

:system:format:separate?

:system:format:separate□{ON | NONE | SPACE}

Function:

The command queries and sets the format of system data separator.

Explanations:

:system:format:separate?: Query the format of system data separator.

:system:format:separate□{ON | NONE | SPACE}: Set the format of system data separator. "ON" denotes "," represents the seperator, "NONE" denotes not displaying the spererator, and "SPACE" denotes that a space represents the separator.

Return Format:

The query returns the current format of data seperator: ON, NONE or SPACE.

8. :system:display:bright

Command Format:

:system:display:bright?

:system:display:bright□<value>

Function:

The command queries and sets display brightness.

Parameters:

Name	Type	Range of Values	Default
<value>	Consecutive Integer	0~32	21

Explanations:

:system:display:bright?: Query the display brightness.

:system:display:bright□<value>: Set the display brightness. The brightness value is an integer among 0~32. 0 is the minimum bright, and 32 is maximum.

Return Format:

The query returns the current bright, and the range is 0~32.

9. :system:display:contrast

Command Format:

:system:displaycontrast?

:system:displaycontrast□<value>

Function:

The command queries and sets display contrast.

Parameters:

Name	Type	Range of Values	Default
<value>	Consecutive Integer	0~32	19

Explanations:

:system:displaycontrast?: Query the display contrast.

:system:displaycontrast□<value>: Set the display contrast. The contrast is an integer among 0~32. 0 is the minimum, and 32 is maximum.

Return Format:

The query returns the current display contrast, and the range is 0~32.

10. :system:display:invert

Command Format:

:system:display:invert

Function:

The command inverts the display color.

Utility Commands

The commands are used to set communication control and self-inspection. Before, please make sure that communication interface has been connected stably, otherwise it possible to be abnormal or wrong.

Which mainly include:

- :utility:interface:LAN:dhcp
- :utility:interface:LAN:ip
- :utility:interface:LAN:mask
- :utility:interface:LAN:gateway
- :utility:interface:LAN:dns
- :utility:interface:GPIB:address
- :utility:interface:RS232:baud
- :utility:interface:RS232:parity

1. :utility:interface:LAN:dhcp

Command Format:

:utility:interface:LAN:dhcp?

:utility:interface:LAN:dhcp□{ON|OFF}

Function:

The command queries and sets the switch state of DHCP for LAN connection.

Explanations:

:utility:interface:LAN:dhcp?: Query whether the DHCP is on.

:utility:interface:LAN:dhcp□{ON|OFF}: Set the switch state of DHCP. "ON" denotes DHCP is on, and "OFF" denotes DHCP is off.

Return Format:

The query returns the current switch state of DHCP: ON or OFF.

2. :utility:interface:LAN:ip

Command Format:

:utility:interface:LAN:ip?

:utility:interface:LAN:ip□<string>

Function:

The command queries and sets IP address for LAN connection.

Parameters:

Name	Type	Range of Values	Default
<string>	character string	self-defined	168.254.0.238

Explanations:

:utility:interface:LAN:ip?: Query the IP address.

:utility:interface:LAN:ip□<string>: Set the IP address. The parameter <string> is the user-defined character string.

Return Format:

The query returns the current IP address.

3. :utility:interface:LAN:mask

Command Format:

:utility:interface:LAN:mask?

:utility:interface:LAN:mask□<string>

Function:

The command queries and sets IP mask for LAN connection.

Parameters:

Name	Type	Range of Values	Default
<string>	character string	self-defined	255.255.255.0

Explanations:

:utility:interface:LAN:mask?: Query the IP mask.

:utility:interface:LAN:mask□<string>: Set the IP mask. The parameter <string> is the user-defined character string.

Return Format:

The query returns the current IP mask.

4. :utility:interface:LAN:gateway

Command Format:

:utility:interface:LAN:gateway?

:utility:interface:LAN:gateway□<string>

Function:

The command queries and sets gateway for LAN connection.

Parameters:

Name	Type	Range of Values	Default
<string>	character string	self-defined	172.16.3.1

Explanations:

:utility:interface:LAN:gateway?: Query the gateway.

:utility:interface:LAN:gateway□<string>: Set the gateway. The parameter

<string> is the user-defined character string.

Return Format:

The query returns the current gateway.

5. :utility:interface:LAN:dns

Command Format:

:utility:interface:LAN:dns?

:utility:interface:LAN:dns□<string>

Function:

The command queries and sets DNS address for LAN connection.

Parameters:

Name	Type	Range of Values	Default
<string>	character string	self-defined	0.0.0.0

Explanations:

:utility:interface:LAN:dns?: Query the DNS address.

:utility:interface:LAN:dns□<string>: Set the DNS address. The parameter <string> is the user-defined DNS address.

Return Format:

The query returns the current DNS address.

6. :utility:interface:GPIB:address

Command Format:

:utility:interface:GPIB:address?

:utility:interface:GPIB:address□<value>

Function:

The command queries and sets GPIB address.

Parameters:

Name	Type	Range of Values	Default
<value>	Consecutive Integer	0~30	7

Explanations:

:utility:interface:GPIB:address?: Query the GPIB address.
:utility:interface:GPIB:address□<value>: Set the GPIB address.

Return Format:

The query returns the current GPIB address, the range is 0~30.

7. :utility:interface:RS232:baud

Command Format:

:utility:interface:RS232:baud?
:utility:interface:RS232:baud□<value>

Function:

The command queries and sets communication baud rate of serial interface (RS232).

Parameters:

Name	Type	Range of Values
<value>	discrete	{1200|2400|4800|9600|19200|38400|57600|115200}

Explanations:

:utility:interface:RS232:baud?: Query the RS232 baud rate.
:utility:interface:RS232:baud□<value>: Set the RS232 baud rate.

Return Format:

The query returns the current RS232 baud rate.

8. :utility:interface:RS232:parity

Command Format:

:utility:interface:RS232:baud?

:utility:interface:RS232:baud□{none8bits|odd7bits|even7bits}

Function:

The command queries and sets communication parity bit of serial interface (RS232).

Explanations:

:utility:interface:RS232:baud?: Query the RS232 parity bit.

:utility:interface:RS232:baud□{none8bits|odd7bits|even7bits}: Set the RS232 parity bit.

Return Format:

The query returns the current parity bit: none8bits, odd7bits or even7bits. The range of the return value is the same as the setting parameter. It respectively means "none parity, 8 bits", "odd, 7 bits", and "even, 7 bits".

Trigger Commands

The commands are used to set the parameters of tigger system .

Which mainly include:

- :trigger:source
- :trigger:auto:interval
- :trigger:auto:hold
- :trigger:auto:hold:sensitivity
- :trigger:single
- :trigger:single:triggered
- :trigger:ext
- :trigger:vmcomplete:polar
- :trigger:vmcomplete:pulsewidth

1. :trigger:source

Command Format:

:trigger:source?

:trigger:source□{AUTO|SINGLE|EXT}

Function:

The command queries and sets trigger souce.

Return Format:

The query returns current trigger source: auto, single or ext, and they respectively denotes "automatic trigger","single trigger", and "external trigger".

2. :trigger:auto:interval

Command Format:

:trigger:auto:interval?

:trigger:auto:interval□<value>

Function:

The command queries and sets the interval time for auto trigger.

Parameters:

Name	Type	Range of Values
<value>	consecutive integer	See Explanations

Explanations:

Different rate has different interval: The default interval is 8 ms when in Fast measrue, and the optional range is between 8 ms and 2000 ms; in Medium measure, the default interval is 50 ms, and the optional range is between 50 ms and 2000 ms; in Slow measure, the default interval is 400 ms, and the optional range is between 400 ms and 2000 ms. The default measuring rate is Slow, so the default is 400 ms.

Return Format:

The query returns the current interval for auto trigger (the unit is ms).

3. :trigger:auto:hold

Command Format:

:trigger:auto:hold?
:trigger:auto:hold□{ON|OFF}

Function:

The command queries and sets the enable state of auto trigger delay.

Explanations:

:trigger:auto:hold?: Query the enable state of auto trigger delay.
:trigger:auto:hold□{ON|OFF}: Enable or disable auto trigger delay.

Return Format:

The query returns the current enable state of auto trigger delay. "ON" means the delay is on, and "OFF" means off.

4. :trigger:auto:hold:sensitivity

Command Format:

:trigger:auto:hold:sensitivity?
:trigger:auto:hold:sensitivity□{0|1|2|3}

Function:

The command queries and sets the sensitivity of auto trigger delay.

Explanations:

:trigger:auto:hold:sensitivity?: Query the sensitivity of auto trigger delay.
:trigger:auto:hold:sensitivity□{0|1|2|3}: Set the sensitivity of auto trigger delay.
The table 3-8 indicates the parameters and the sensitivities.

Table 3-8 The auto trigger delay sensitivities

Parameter	Sensitivity
0	0.01%
1	0.1%
2	1%
3	10%

Return Format:

The query returns the parameter related to current sensitivity: 0, 1, 2 or 3.(See Table 3-8)

5. :trigger:single

Command Format:

:trigger:single?

:trigger:single□{<value>|MIN|MAX|DEF }

Function:

The command queries and sets sampling times of single trigger.

Explanations:

:trigger:single?: Query sampling times of single trigger.

:trigger:single□{<value>|MIN|MAX|DEF }: Set sampling times of single trigger.

Parameters:

Name	Type	Range of Values	Default
<value>	consecutive integer	1~5000	1

Return Format:

The query returns the current sampling times.

6. :trigger:single:triggered

Command Format:

:trigger:single:triggered

Function:

The command carries out the function of single trigger.

Explanation:

The command equals to doing a single trigger by manual operation.

7. :trigger:ext

Command Format:

:trigger:ext?
:trigger:ext□{RISE|FALL|HIGH|LOW}

Function:

The command queries and sets exterior trigger mode.

Explanations:

:trigger:ext?: Query the exterior trigger mode, and the default is the rise edge trigger.
:trigger:ext□{RISE|FALL|HIGH|LOW}: Set the exterior trigger mode. The parameters respectively means "rise edge trigger", "fall edge trigger", "high level trigger" and "low level trigger".

Return Format:

The query returns the current trigger mode: rise, fall, high or low.

8. :trigger:vmcomplete:polar

Command Format:

:trigger:vmcomplete:polar?
:trigger:vmcomplete:polar□{POS|NEG}

Function:

The command queries and sets VMC output polar.

Explanations:

:trigger:vmcomplete:polar?: Query the VMC output polar, and the default is positive.
:trigger:vmcomplete:polar□{POS|NEG}: Set the VMC output polar. The parameters respectively means "positive polar" and "negative polar".

Return Format:

The query returns the current VMC output polar: pos or neg.

9. :trigger:vmcomplete:pulsewidth

Command Format:

:trigger:vmcomplete:pulsewidth?

:trigger:vmcomplete:pulsewidth□<value>

Function:

The command queries and sets VMC output pulsewidth.

Parameters:

Name	Type	Range	Default
<value>	consecutive integer	See Explanations	100

Explanations:

:trigger:vmcomplete:pulsewidth?: Query the VMC output pulsewidth. The default is 100 ms.

:trigger:vmcomplete:pulsewidth□<value>: Set the VMC output pulsewidth. The range of output pulsewidth is vary with sample rate. When the sample is S, the range is 1ms~400ms; when the sample is M, the range is 1ms~200ms; when the sample is F, the range is 1ms~30ms.

Return Format:

The query returns the current VMC output pulsewidth.

Calculate Commands

The commands are used to set parameters for calculate system.

Which mainly include:

- :calculate:function
- :calculate:statistic:min?
- :calculate:statistic:max?
- :calculate:statistic:average?
- :calculate:statistic:count?
- :calculate:statistic:state
- :calculate:REL:offset
- :calculate:REL:state
- :calculate:DB?
- :calculate:DB:reference
- :calculate:DB:state
- :calculate:DBM?
- :calculate:DBM:reference
- :calculate:DBM:state
- :calculate:limit?
- :calculate:limit:lower
- :calculate:limit:upper
- :calculate:limit:state

1. :calculate:function

Command Format:

:calculate:function?

:calculate:function□{NONE|REL|DB|DBM|MIN|MAX|AVERAGE|TOTAL|LIMIT}

Function:

The command queries and sets the function of math calculation .

Explanations:

:calculate:function?: Query current function of math calculation. The default is NONE (turning off math calculation).

:calculate:function□{NONE|REL|DB|DBM|MIN|MAX|AVERAGE|TOTAL|LIMIT}

: Set the function of math calculation.

The table 3-9 indicates the parameters and their meanings.

Table 3-9 The math calculation parameters and their meanings

Parameter	Meaning
NONE	turning off math calculation
REL	NULL calculation
DB	dB calculation
DBM	dBm calculation
MIN	minimum calculation
MAX	maximum calculation
AVERAGE	average calculation
TOTAL	total calculation
LIMIT	limit calculation

Return Format:

The query returns the parameter related to current function of math calculation. See Table 3-9.

2. :calculate:statistic:min?

Command Format:

:calculate:statistic:min?

Function:

The command queries statistic minimum.

Explanation:
Only when MIN calculation is available, the command is just available.

Return Format:
The query returns current statistic minimum.

3. :calculate:statistic:max?

Command Format:
:calculate:statistic:max?

Function:
The command queries statistic maximum.

Explanation:
Only when MAX calculation is available, the command is just available.

Return Format:
The query returns current statistic maximum.

4. :calculate:statistic:average?

Command Format:
:calculate:statistic:average?

Function:
The command queries statistic average.

Explanation:
Only when the AVERAGE calculation is available, the command is just available.

Return Format:
The query returns current statistic average.

5. :calculate:statistic:count?

Command Format:
:calculate:statistic:count?

Function:
The command queries measuring times in calculation.

Explanation:
The command is available to current measure operation. If shift measuring function, to restart counting.

Return Format:
The query returns current measuring times.

6. :calculate:statistic:state

Command Format:
:calculate:statistic:state?
:calculate:statistic:state□{ON|OFF}

Function:
The command queries and sets the enable state of Stat. operation.

Explanations:
:calculate:statistic:state?: Query the enable state of Stat. operation.
:calculate:statistic:state□{ON|OFF}: Enable or disable Stat. operation.

Return Format:
The query returns the enable state of Stat. Operation: ON or OFF.

Example:
Disable the Stat. operation.
:calculate:statistic:state□OFF

7. :calculate:REL:offset

Command Format:

:calculate:REL:offset?

:calculate:REL:offset□{<range>|MIN|MAX|DEF|CURR}

Function:

The command queries and sets the offset of NULL calculation.

Parameters:

Name	Type	Range of Values	Default
<value>	consecutive real number	See Table 3-10	0

Explanations:

:calculate:REL:offset?: Query the offset of NULL calculation.

:calculate:REL:offset□{<range>|MIN|MAX|DEF|CURR}:Set the offset of NULL calculation.

The range varies with both measuring type and range (see Table 3-10). Each value could reach to the sixth digit after decimal. MAX denotes maximum effective value and MIN denotes minimum effective value. All the values are only apply to current measuring function.

Table 3-10 The range of NULL calculation offset

Meaurement	Range	DEF	Unit
DC Voltage	±1200	0	V
AC Voltage	±900	0	V
DC Current	±12	0	A
AC Current	±12	0	A
Resistance	±1.2e+08	0	Ω
Capacitance	±1.2e-02	0	F
Frequency	±1.2e+06	0	HZ

Return Format:

The query returns current offset of NULL calculation.

8. :calculate:REL:state

Command Format:
:calculate:REL:state?
:calculate:REL:state□{ON|OFF}

Function:
The command queries or sets the enable state of REL operation.

Explanations:
:calculate:REL:state?: Enable or disable REL operation.
:calculate:REL:state□{ON|OFF}: Set the enable state of REL operation.

Example:
Disable REL operation:
:calculate:statistic:state□OFF

9. :calculate:DB?

Command Format:
:calculate:DB?

Function:
The command queries dB value.

Explanations:
This command is available only when dB operation is on.

Return Format:
The query returns current dB value.

10. :calculate:DB:reference

Command Format:
:calculate:DB:reference?
:calculate:DB:reference□{<range>|MIN|MAX|DEF}

Function:

The command queries and sets dB reference value.

Parameters:

Name	Type	Range of Values	Default
<value>	consecutive integer	120 dBm~+120 dBm	0

Explanations:

:calculate:DB:reference?: Query the dB reference value.

:calculate:DB:reference□{<range>|MIN|MAX|DEF}: Set the dB reference value.

This command is available only when dB operation is on.

When setting dB reference value, <value> should be an integer between +120dB and -120dB. MIN denotes -120dB, MAX denotes +120dB, and DEF denotes 0.

Return Format:

The query returns current dB reference value.

11. :calculate:DB:state

Command Format:

:calculate:DB:state?

:calculate:DB:state□{ON|OFF}

Function:

The command queries or sets the enable state of dB operation.

Explanations:

:calculate:DB:state?: Query the enable state of dB operation.

:calculate:DB:state□{ON|OFF}: Enable or disable dB operation.

Return Format:

The query returns the enable state of dB operation: ON or OFF.

Example:

Disable dB operation:

:calculate:DB:state□OFF

12. :calculate:DBM?

Command Format:
:calculate:DBM?

Function:
The command queries dBm value.

Explanation:
This command is available only when dBm operation is on.

Return Format:
The query returns current dBm value.

13. :calculate:DBM:reference

Command Format:
:calculate:DBM:reference?
:calculate:DBM:reference□{<range>|MIN|MAX|DEF}

Function:
The command queries and sets dBm reference resistance.

Parameters:

Name	Type	Range of Values	Default
<value>	Consecutive integer	2~8000	600

Explanations:
:calculate:DBM:reference?: Query the dBm reference resistance.
:calculate:DBM:reference□{<range>|MIN|MAX|DEF}: Set the dBm reference resistance. This command is available only when dBm operation is on. When setting dBm reference resistance, the <value> should be an integer between 2 and 8000, and the unit is Ω. MIN denotes 2Ω, MAX denotes 8000Ω, and DEF denotes 600Ω.

Return Format:
The query returns current dBm reference resistance.

14. :calculate:DBM:state

Command Format:
:calculate:DBM:state?
:calculate:DBM:state□{ON|OFF}

Function:
The command queries or sets the enable state of dBm operation.

Explanations:
:calculate:DBM:state?: Query the enable state of dBm operation.
:calculate:DBM:state□{ON|OFF}: Enable or disable dBm operation.

Return Format:
The query returns the enable state of dBm operation: ON or OFF that denotes turning dBm operation on or off.

Example:
Disable Stat. Operation:
:calculate:DB:state□OFF

15. :calculate:limit?

Command Format:
:calculate:limit?

Function:
The command queries the result of P/F calculation.

Explanation:
When the measuring value is between min and max, the command returns pass, or else fail.

Return Format:
The query returns whether P/F calculation have passed: PASS or FAIL.

16. :calculate:limit:lower

Command Format:

:calculate:limit:lower?

:calculate:limit:lower□<value>

Function:

The command queries and sets lower value of P/F calculation.

Parameters:

Name	Type	Range of Value	Default
<value>	consecutive real number	See Table 3-11	0

Explanations:

:calculate:limit:lower?: Query the lower value of P/F calculation.

:calculate:limit:lower□<value>: Set the lower value of P/F calculation. The default range of <range> please refer to table 3-11.

Table 3-11 The range of P/F calculation

Measurement	Range	DEF	Unit
DC Voltage	±1200	0	V
AC Voltage	0~900	0	V
DC Current	±12	0	A
AC Current	0~12	0	A
Resistance	0~1.2e+08	0	Ω
Capacitance	0~1.2e-02	0	F
Frequency	0~1.2e+06	0	HZ

Return Format:

The query returns current lower value.

17. :calculate:limit:upper

Command Format:

:calculate:limit:upper?

:calculate:limit:upper□<value>

Function:
The command queries and sets upper value in P/F calculation.

Parameters:

Name	Type	Range of Values	Default
<value>	consecutive real number	See table 3-11	0

Explanations:
:calculate:limit:upper?: Queriy the upper value of P/F operation.
:calculate:limit:upper□<value>: Set the upper value of P/F calculation. The default range of <range> please refer to Table 3-11.

Return Format:
The query returns current upper value.

18. :calculate:limit:state

Command Format:
:calculate: limit:state?
:calculate: limit:state□{ON|OFF}

Function:
The command queries the enable state of P/F operation.

Explanations:
:calculate: limit:state?: Enable or disable P/F operation.
:calculate: limit:state□{ON|OFF}: Set the state of P/F operation.

Return Format:
The query returns the enable state of P/F operation: ON or OFF that denotes turning P/F operation on or off.
.
Example:
Disable P/F operation:
:calculate:limit:state□OFF

Double-Display Commands

The commands set or query the related parameter for Double Display function.

Which mainly include:

- :function2?
- :function2:value1?
- :function2:value2?
- :function2:voltage:DC
- :function2:voltage:AC
- :function2:current:DC
- :function2:current:AC
- :function2:frequency
- :function2:period
- :function2:resistance
- :function2:capacitance

1. :function2?

Command Format:
:function2?

Function:
This command queries the measuring function of vice display screen.

Explanation:
This command is available only when Double Display is on.

Return Format:
The query returns the identifier related to measuring function of vice display. The return value may be DCV, ACV, DCI, ACI, 2WR, CAP, 4WR, FREQ or PERI.

2. :function2:value1?

Command Format:
:function2:value1?

Function:
This command queries the measuring value of main display.

Explanation:
This command is available only when Double Display is on.

Return Format:
The query returns the measuring value of main display.

3. :function2:value2?

Command Format:
:function2:value2?

Function:
This command queries the measuring value of vice display.

Explanation:
This command is available only when Double Display is on.

Return Format:
The query returns the measuring value of vice display.

4. :function2:voltage:DC

Command Format:
:function2:voltage:DC

Function:
The command sets the measuring function of vice display as DCV function.

Explanation:
Here, the measuring function of main display should be DCV, DCI, ACV or ACI only.

5. :function2:voltage:AC

Command Format:
:function2:voltage:AC

Function:
The command sets the measuring function of vice display as ACV function.

Explanation:
Here, the measuring function of main display should be DCV, DCI, ACV, ACI, FREQUENCY or PERIOD only.

6. :function2:current:DC

Command Format:
:function2:curent:DC

Function:

The command sets the measuring function of vice display as DCI function.

Explanation:
Here, the measuring function of main display should be DCV, DCI, ACV or ACI only.

7. :function2:current:AC

Command Format:
:function2:current:AC

Function:
The command sets the measuring function of vice display as ACI function.

Explanation:
Here, the measuring function of main display should be DCV, DCI, ACV, ACI, FREQUENCY or PERIOD only.

8. :function2:frequency

Command Format:
:function2:frequency

Function:
The command sets the measuring function of vice display as Frequency function.

Explanation:
Here, the measuring function of main display should be ACV, FREQUENCY or PERIOD only.

9. :function2:period

Command Format:
:function2:period

Function:

The command sets the measuring function of vice display as Period function.

Explanation:
Here, the measuring function of main display should be ACV, FREQUENCY or PERIOD only.

10. :function2:resistance

Command Format:
:function2:resistance

Function:
The command sets the measuring function of vice display as Resistance function.

Explanation:
Here, the measuring function of main display should be RESISTANCE or FRESISTANCE only.

11. :function2:capacitance

Command Format:
:function2: capacitance

Function:
The command sets the measuring function of vice display as Capacitance function.

Explanation:
Here, the measuring function of main display should be CAPACITANCE only.

Chapter 4 Compatible Fluke Commands

In **RIGOL** DM3058 digital multimeter commands, all the parameters and return values of Fluke command DM3058 compatible with are ASCII characters. Besides, the input state is insensitive.

The compatible commands mainly include:

- Function Commands
- Function Regulator Commands
- Range and Velocity Commands
- Measuring Commands
- Compare Commands

Function Commands

The commands enable the basic measuring funtion of the instrument, which similar to the related funciton button in front panel.

Which mainly include:

- AAC
- ADC
- CLR2
- CONT
- DIODE
- FREQ
- FUNC
- OHMS
- WIRE
- VAC
- VDC

1. AAC

Command Format:

AAC

AAC2

Function:

The command enables the AC Current measuring function of both main and vice display.

Explanations:

AAC: Enable the AC Current measuring function of main display.

AAC2: Enable the AC Current measuring function of vice display.

2. ADC

Command Format:

ADC

ADC2

Function:

Enable the DC Current measuring function of both main and vice display.

Explanations:

ADC: Enable the DC Current measuring function of main display.

ADC2: Enable the DC Current measuring function of vice display.

3. CLR2

Command Format:

CLR2

Function:

The command clears the measuring value while the measuring function of vice display is enabled.

4. CONT

Command Format:
CONT

Function:
The command enables the Continuity test of main display.

5. DIODE

Command Format:
DIODE

Function:
The command enables the Diode test of main display.

6. FREQ

Command Format:
FREQ
FREQ2

Function:
The command enables the Frequency measuring function of both main and vice display.

Explanation:
FREQ: Enable the Frequency measuring function of main display.
FREQ2: Enable the Frequency measuring function of vice display.

7. FUNC

Command Format:
FUNC1?
FUNC2?

Function:
The command queries the mnemonic of selected funtion on the main or vice

display.

Explanations:

FUNC1?: Query the measuring funtion of main display.
FUNC2?: Query the measuring funtion of vice display.
If the vice display is disable, error will occur for FUNC2?.

Return Format:

The command returns the mnemonic of current measuring function.
FUNC1?: The query may returns: AAC2, ADC2, CONT, DIODE, FREQ, OHMS, WIRE2, WIRE4, VAC, VDC.
FUNC2?: The query may returns: AAC, ADC, FREQ, OHMS, VAC, VDC.

8. OHMS

Command Format:

OHMS
OHMS2

Function:

The command enables the Resistance measuring function of main and vice display.

Explanations:

OHMS: Enable the Resistance measuring function of main display.
OHMS2: Enable the Resistance measuring function of vice display.

9. WIRE

Command Format:

WIRE2
WIRE4

Function:

The command switches 2-wire and 4-wire resistance measuring function each other when measuring.

Explanations:

WIRE2: Enable 2-wire resistance measuring function.

WIRE4: Enable 4-wire resistance measuring function.

Both the resistance measuring function of main and vice display are switched simultaneously when Double Display is on.

10. VAC

Command Format:

VAC

VAC2

Function:

The command enables the AC Voltage measuring function in main and vice display.

Explanations:

VAC: Enable the AC Voltage measuring function in main display.

VAC2: Enable the AC Voltage measuring function in vice display.

11. VDC

Command Format:

VDC

VDC2

Function:

The command enables the DC Voltage measuring function in main and vice display.

Explanations:

VDC: Enable the DC Voltage measuring function in main display.

VDC2: Enable the DC Voltage measuring function in vice display.

Function Regulator Commands

The commands enable the Regulator of the instrument, which similar to the math operation button on the front panel.

Which mainly include:

- DB
- DBCLR
- DBPOWER
- DBREF
- HOLD
- HOLDCLR
- HOLDTHRESH
- MAX
- MAXSET
- MIN
- MINSET
- MNMX
- MNMXSET
- MMCLR
- MOD?
- REL
- RELCLR
- RELSET

1. DB

Command Format:
DB

Function:
The command enables dB function.

Explanation:
The units of all the readings from main display are dB. If ACV or DCV function is disable, an execution error will be occur.

2. DBCLR

Command Format:
DBCLR

Function:
The command exits dB mode.

3. DBPOWER

Command Format:
DBPOWER

Function:
The command enables dB power conditioner when the reference impedance of dbm is 2, 4, 8 or 16 ohms and Voltage function has been enabled, or else a execution error will be occur. The unit of readings shown on the main display is W in dB mode.
Here is the formula of power: (Volts is measuring value)

$$Power = \frac{Volts^2}{R_{ref}}$$

4. DBREF

Command Format:

DBREF□<value>

DBREF?

Function:

The command sets or queries the dB reference resistance.

Explanations:

The command sets the reference resistance as the <value> listed in table 4-1. If the value you have set are not involved in it, an execution error will be occur.

Table 4-1 Reference Resistance

Parameter	References	Parameter	References
1	2	12	150
2	4	13	250
3	8	14	300
4	16	15	500
5	50	16	600
6	75	17	800
7	93	18	900
8	110	19	1000
9	124	20	1200
10	125	21	8000
11	135		

Return Format:

The query returns the selected reference value (see table 4-1).

5. HOLD

Command Format

HOLD

Function:

The command enables Touch Hold function of the instrument.

Explanations:

A reading will be force to show on the screen if the instrument has already been in this mode while you send HOLD.

6. HOLDCLR

Command Format:

HOLDCLR

Function:

The command disable Touch Hold function and back to normal operation.

7. HOLDTHRESH

Command Format:

HOLDTHRESH□<threshold>

HOLDTHRESH?

Function:

The command sets or queries the threshold of HOLD.

Explanations:

HOLDTHRESH□<threshold>: Set the threshold of HOLD as <threshold>, the value of it should be 1, 2, 3 or 4 (which separately corresponding to 0.01%, 0.1%, 1%, 10%), any other value will lead an execution error.

HOLDTHRESH?: Query the <threshold>.

Return Format:

The query returns the value of HOLD such as 1, 2, 3 or 4 (0.01%, 0.1%, 1%, 10%).

8. MAX

Command Format:

MAX

Function:
The command enables the MAX adjustor mode and sets the current reading as Maximum.

Explanation:
If the instrument has already been in this mode, the maximum will be shown directly. In MAX mode, auto range may be forbidden.

9. MAXSET

Command Format:
MAXSET□<numeric value>

Function:
The command enables the MAX mode and sets the <numeric value> as maximum.

Explanations:
<numeric value> could be either a signed real number or a signed real number with index and also the parameter should be higher than last one. If the <numeric value> exceeds the range, an execution error may be occur. Auto range may be forbidden.

10. MIN

Command Format:
MIN

Function:
The command enables the MIN mode and set the current reading as minimum.

Explanations:
If the instrument has already been in this mode, a minimum will be shown directly. In MIN mode, auto range may be forbidden. Auto range may be forbidden.

11. MINSET

Command Format:
MINSET□<numeric value>

Function:
The command enables the MIN mode and sets the <numeric value> as minimum.

Explanations:
<numeric value> could be either a signed integer, a signed real number without exponent, or a signed real number with exponent and also the parameter should be smaller than last one. If the <numeric value> exceeds the range, an execution error may be occur. Auto range may be forbidden.

12. MNMX

Command Format:
MNMX

Function:
The command enables the MIN MAX mode and sets the current reading as minimum or maximum.

Explanations:
If the instrument has already been in this mode, a minimum or maximum will be shown directly. In MIN MAX mode, the minimum or maximum could be switched each other and never lose.

13. MNMXSET

Command Format:
MNMXSET□<numeric1, numeric2>

Function:
The command enables the MIN MAX mode and separately sets the<numeric1>as minimum or <numeric2> as maximum.

Explanations:

Both <numeric1>and<numeric2> could be a signed integer, a signed real number without exponent, or a signed real number with exponent. If either <numeric1> or <numeric2>exceeds the range, an execution error may be occur.

14. MMCLR

Command Format:
MMCLR

Function:
The command disables the MIN MAX mode and meanwhile both the minimum and the maximum are lost.

Explanations:
Then the instrument back to Range mode and the selected range is the one before MIN MAX mode.

15. MOD?

Command Format:
MOD?

Function:
The command queries the numerical value related to current mode.

Explanations:
1 = MIN; 2 = MAX; 4 = HOLD; 8 = dB; 16 = DBPOWER; 32 = REL; 64 = COMP. If several adjuster modes are selected, the query returns the sum of corresponding value related to selected mode. If no adjuster is selected, the query returns 0. For example: if selected dB or REL, the return is 40.

Returns Format:
The query returns the value related to current mode.

16. REL

Command Format:

REL

Function:

The command enables the REL mode and sets the value shown on the main display as its value.

17. RELCLR

Command Format:

RELCLR

Function:

The command disables the REL mode and backs to Range mode. The range is the one before REL.

18. RELSET

Command Format:

RELSET□<relative base>

RELSET?

Function:

RELSET□<relative base>: Enable the REL mode and set <relative base> as its value.

RELSET?: Query the current <relative base>. If the REL mode is not enables, an execution error may be occur.

Explanation:

<relative base> could be a signed integer, a signed real number without exponent, or a signed real number with exponent. If <relative base>exceeds the range, an execution error may be occur.

Return Format:

The query returns the <relative base> in REL mode.

Range and Velocity Commands

The commands set or query the measuring range and the measuring velocity, which similar to the related range button or digit button.

Which mainly include:

- AUTO
- FIXED
- RANGE
- RATE

1. AUTO

Command Format:

AUTO

AUTO?

Function:

The command sets or queries the mode of Auto range of the instrument.

Explanation:

AUTO: Set the mode of range of the instrument as Auto. If this mode can not be selected (or when Diode or Continuity test is active), execution error will be occur.

AUTO?: Query whether the instrument is in Auto range mode or not.

Return Format:

The query returns the current mode of range. 1 denotes Auto, 2 denotes Not.

2. FIXED

Command Format:

FIXED

Function:

The command exits the Auto range mode of main display and enters into Manual mode. The current range is to be the selected range.

3. RANGE

Command Format:

RANGE□<value range>

RANGE1?

RANGE2?

Function:

RANGE□<value range>: Set the range of main display as <value range>. These range are related to the range of Function (Current, Voltage, Resistance, and

etc.), for the detailed range please refer to table 4-2.
RANGE1?: Query the range that has been selected currently on the main display.
RANGE2?: Query the range that has been selected currently on the vice display. If the vice display does not been actived, execution error will be occur.

Return Format:
The query returns the range that has been selected currently on the main or vice display.

Table 4-2 Optional ranges of every function

No.	DC V	ACV, Period, Frequency	Resistance	ACI	DCI	Capacitance
0	200 mV	200 mV	200Ω	20mA	200 μA	2nF
1	2 V	2 V	2 kΩ	200mA	2 mA	20nF
2	20 V	20 V	20 kΩ	2 A	20 mA	200nF
3	200 V	200 V	200 kΩ	10 A	200 mA	2μF
4	1000 V dc	750 V dc	2 MΩ	NA	2 A	200μF
5	NA	NA	20 MΩ	NA	10 A	10000μF
6	NA	NA	100 MΩ	NA	NA	NA

4. RATE

Command Format:
RATE□<speed>
RATE?

Function:
The command sets or queries the measuring rate.

Explanations:
RATE□<speed>: Set the measuring velocity as <speed> such as S (2.5 readings/s), M (20 readings/s) or F (120 readings/s). The the input state is insensitive, any of other characters will lead to execution error.

Return Format:
The query returns the character stand for velocity: S (2.5 readings/s), M (20 readings/s) or F (120 readings/s).

Measuring Commands

The commands query the measuring results and show them on the main or vice display.

Which mainly include:

- MEAS
- VAL

1. MEAS

Command Format:

MEAS?
MEAS1?
MEAS2?

Function：

MEAS?: Query the measuring value of the instrument.
MEAS1?: Query the measuring value of main display.
MEAS2?: Query the measuring value of vice display. If the vice display is disable, The execution error wll be occur.

Return Format:

MEAS?: The command returns the value of both the vice and main display if they are active. If the vice display is disable, the function of "MEAS?" is equal to "MEAS1?".
MEAS1?: The command returns the value of main display.
MEAS2?: The command returns the value of vice display. If the vice display is disable, The execution error wll be occure.

2. VAL

Command Format:

VAL?
VAL1?
VAL2?

Function:

VAL?: Query the measuring value of the instrument.
VAL1?: Query the measuring value of main display.
VAL2?: Query the measuring value of vice display.

Return Format:

VAL?: The query returns those two values as the selected format if both the main and vice display are actived; if only main display is active, the query returns its value; if one of the display is empty, the query returns its value when next trigger.
VAL1?: The command returns the measuring value of main display. If the main

display is empty, it will return to the value of next trigger.

VAL2?: The command returns the measuring value of vice display. If the vice display is empty, it will return to the value of next trigger. If the vice display is disable, the execution error wll be occur.

Compare Commands

The commands compare whether the value measured by the instrument is higer or lower or belong to the regulated range, which mainly include:

- COMP
- COMPCLR
- COMPHI
- COMPLO
- HOLDCLR

1. COMP

Command Format:
COMP
COMP?

Function:
COMP: Disable the Compare function (COMP). Touch Hold will be actived automaticlly (you can disable it via HOLDCLR command).
COMP? Query the result of last comparation.

Return Format:
The query returns the result of last comparation. If the measuring result is higher than the maximum of range, it returns LO; if belong to the range, it returns PASS; or returns "—" if the measuring has not been finished yet.

2. COMPCLR

Command Format:
COMPCLR

Function:
The command disables the Compare function together with Touch Hold and then back to normal work. If Touch Hold mode selected, also exit.

3. COMPHI

Command Format:
COMPHI□<high value>

Function:
The command sets the upper limit (HI) of COMP as <high value>.

Explanation:
<high value> could be either a signed integer or a signed real number.

4. COMPLO

Command Format:

COMPLO□<low value>

Function:

The command sets the lower limit (LO) of COMP as <low value>.

Explanation:

<low value> could be either a signed integer or a signed real number.

5. HOLDCLR

Command Format:

HOLDCLR

Function:

The command disables the Touch Hold but except for COMP function and back to normal work.

Chapter 5 Compatible Agilent Commands

In Agilent commands , all the command parameters and the return values are ASCII characters. Before using it, please send the command **CMDSET** firstly, that is send CMDSET□AGILENT. The system can't identify capitalization and lower case, and support the shortening of key words. (The commands are abbreviated in the form of capitalization so as to be viewed more conveniently. The compatible commands must follow syntax strictly. For example, unwanted characters are not allowed in command trees; command trees and parameters can be separated only by a space, unwanted characters can not exist behind parameters, or a beep will be generated to alarm for a execution error.

Agilent commands **RIGOL** DM3058 compatible with mainly include the following commands subsystems:

- Calculate Commands
- Configure Commands
- Data Commands
- Fetch Commands
- Measure Commands
- Memory Commands
- Output Commands
- Sample Commands
- Sense Commands
- System Commands
- Trigger Commands

Calculate Commands

The commands are used to set calculation function to do math operation, statistic operation and limit operation.

Which mainly include:

- CALCulate:FUNCtion
- CALCulate:STATe
- CALCulate:LIMit:LOWer
- CALCulate:LIMit:UPPer
- CALCulate:DB:REFerence
- CALCulate:DBM:REFerence
- CALCulate:NULL:OFFSet
- CALCulate:AVERage:AVERage?
- CALCulate:AVERage:CLEar
- CALCulate:AVERage:COUNt?
- CALCulate:AVERage:MAXimum?
- CALCulate:AVERage:MINimum?
- CALCulate:AVERage:PTPeak?
- CALCulate:AVERage:SDEViation?

1. CALCulate:FUNCtion

Command Format:

CALCulate:FUNCtion□{NULL | DB | DBM | AVERage | LIMit}

CALCulate:FUNCtion?

Function:

The command sets or queries calculation function.

Explanations:

Firstly, send the command "CALCulate:STATe□{OFF | ON}" to enable the calculation subsystem.

CALCulate:FUNCtion□{NULL | DB | DBM | AVERage | LIMit}: Select the calculation function, the default is NULL.

CALCulate:FUNCtion?: Query the current calculation function.

Table 5-1 The math operation identifiers and their meanings

Calculation Identifier	Meaning
NULL	Null operation
DB	dB operation
DBM	dBm operation
AVERAGE	Average operation
LIMIT	Limit operation

Return Format:

The query returns the calcaulation identifier: NULL, DB, DBM, AVERage or LIMit.

2. CALCulate:STATe

Command Format:

CALCulate:STATe□{OFF | ON}

CALCulate:STATe?

Function:

The command sets or queries the enable state of calculate function.

Explanations:

CALCulate:STATe□{OFF | ON}: Enable or disable calculation function.

CALCulate:STATe?: Query current enable state of calculation function.

Return Format:

The query returns current enable state: ON or OFF.

3. CALCulate:LIMit:LOWer

Command Format:

CALCulate:LIMit:LOWer□{<value> | MINimum | MAXimum}

CALCulate:LIMit:LOWer?□{MINimum | MAXimum}

Function:

The command sets or queries the lower limit of current calculation function.

Parameters:

Name	Type	Range of Values	Default
<value>	Consecutive Real Number	±120% max range	0

Explanations:

Firstly, do enable calculation function (CALCulate:STATe□ON) and select limit function (CALCulate:FUNCtion□LIMIT) to run the command.

CALCulate:LIMit:LOWer□{<value> | MINimum | MAXimum}: Set the lower limit of current calculation function.

CALCulate:LIMit:LOWer?□{MINimum | MAXimum}: Query the lower limit of current calculation function.

MIN is -120% max range of current function, MAX is 120% max range of current function, DEF = 0.

Return Format:

The query returns the lower limit of current calculation function.

4. CALCulate:LIMit:UPPer

Command Format:

CALCulate:LIMit:UPPer□{<value> | MINimum | MAXimum}

CALCulate:LIMit:UPPer?□{MINimum | MAXimum}

Function:

The command sets or queries the upper limit of current calculation function.

Parameters:

Name	Type	Range of Values	Default
<value>	Consecutive Real Number	±120% max range	0

Explanations:

Firstly, do enable calculation function (CALCulate:STATe□ON) and select limit function (CALCulate:FUNCtion□LIMIT) to run the command.

CALCulate:LIMit:UPPer□{<value> | MINimum | MAXimum}: Set the upper limit of current calculation function.

CALCulate:LIMit:UPPer?□{MINimum | MAXimum}: Query the upper limit of current calculation function.

MIN is -120% max range of current function, MAX is 120% max range of current function, DEF = 0.

Return Format:

The query returns the upper limit of current calculation function.

5. CALCulate:DB:REFerence

Command Format:

CALCulate:DB:REFerence□{<value> | MINimum | MAXimum}

CALCulate:DB:REFerence?□{MINimum | MAXimum}

Function:

The command sets or queries the reference value of dB.

Parameters:

Name	Type	Range of Values	Default
<value>	Consecutive Real Number	-120 dB~+120 dB	0

Explanations:

Firstly, do enable calculation function (CALCulate:STATe□ON) and select limit function (CALCulate:FUNCtion□DB) to run the command.

CALCulate:DB:REFerence □ {<value> | MINimum | MAXimum}: Set the reference value of dB.

CALCulate:DB:REFerence?□{MINimum | MAXimum}: Query the reference value of dB.

MIN = -120 dB, MAX = 120 dB, DEF = 0 dB.

Return Format:

The query returns the reference value of dB.

6. CALCulate:DBM:REFerence

Command Format:

CALCulate:DBM:REFerence□{<value> | MINimum | MAXimum}

CALCulate:DBM:REFerence?□{MINimum | MAXimum}

Function:

The command sets or queries the reference value of dBm.

Parameters:

Name	Type	Range of Values	Default
<value>	Consecutive Integer	2~8000	600

Explanations:

Firstly, do enable calculation function (CALCulate:STATe□ON) and select limit function (CALCulate:FUNCtion□DBM) to run the command.

CALCulate:DB:REFerence□{<value> | MINimum | MAXimum}: Set the reference value of dBm.

CALCulate:DB:REFerence?□{MINimum | MAXimum}: Query the reference value of dBm.

MIN = 2 ohms, MAX = 8000 ohms, DEF = 600 ohms.

Return Format:

The query returns the reference value of dBm.

7. CALCulate:NULL:OFFSet

Command Format:

CALCulate:NULL:OFFSet□{<value> | MINimum | MAXimum}
CALCulate:NULL:OFFSet?□{MINimum | MAXimum}

Function:

The command sets or queries the Null offset.

Parameters:

Name	Type	Range of Values
<value>	Consecutive Integer	±120% max range

Explanations:

Firstly, do enable calculation function (CALCulate:STATe□ON) and select limit function (CALCulate:FUNCtion□NULL) to run the command.
CALCulate:NULL:OFFSet□{<value> | MINimum | MAXimum}: Set the Null offset.
CALCulate:NULL:OFFSet?□{MINimum | MAXimum}: Query the Null offset.
MIN is -120% max range of current function, MAX is 120% max range of current function.

Return Format:

The query returns the NULL offset.

8. CALCulate:AVERage:AVERage?

Command Format:

CALCulate:AVERage:AVERage?

Function:

The command queries the average of all statistical data.

Explanations:

Firstly, do enable calculation function (CALCulate:STATe□ON) and select limit function (CALCulate:FUNCtion□AVERage) to run the command.
The average can be queried at any time.

Return Format:

The query returns the average of all the statistical data.

9. CALCulate:AVERage:CLEar

Command Format:
CALCulate:AVERage:CLEar

Function:
The command recovers all the settings of calculation function in current measurement to the defaults.

Explanations:
Firstly, do enable calculation function (CALCulate:STATe□ON) and select limit function (CALCulate:FUNCtion□AVERage) to run the command.
The data include minimum, maximum, average, number of data and standard deviation.

10. CALCulate:AVERage:COUNt?

Command Format:
CALCulate:AVERage:COUNt?

Function:
The command queries the number of statistical data.

Explanations:
Firstly, do enable calculation function (CALCulate:STATe□ON) and select limit function (CALCulate:FUNCtion□AVERage) to run the command.
The number of statistical data can be queried at any time.

Return Format:
The query returns the number of statistical data.

11. CALCulate:AVERage:MAXimum?

Command Format:

CALCulate:AVERage:MAXimum?

Function:
The command queries the maximum of statistical data.

Explanations:
Firstly, do enable calculation function (CALCulate:STATe□ON) and select limit function (CALCulate:FUNCtion□AVERage) to run the command.
The maximum of statistical data can be queried at any time.

Return Format:
The query returns the maximum of statistical data.

12. CALCulate:AVERage:MINimum?

Command Format:
CALCulate:AVERage:MINimum?

Function:
The command queries the minimum of statistical data.

Explanations:
Firstly, do enable calculation function (CALCulate:STATe□ON) and select limit function (CALCulate:FUNCtion□AVERage) to run the command.
The minimum of statistical data can be queried at any time.

Return Format:
The query returns the minimum of statistical data.

13. CALCulate:AVERage:PTPeak?

Command Format:
CALCulate:AVERage:PTPeak?

Function:
The command queries the peak-to-peak value of statistical data.

Explanations:

Firstly, do enable calculation function (CALCulate:STATe□ON) and select limit function (CALCulate:FUNCtion□AVERage) to run the command.

The peak-to-peak value of statistical data can be queried at any time.

Return Format:

The query returns the peak-to--peak value of statistical data.

14. CALCulate:AVERage:SDEViation?

Command Format:

CALCulate:AVERage:SDEViation?

Function:

The command queries the standard deviation of statistical data.

Explanations:

Firstly, do enable calculation function (CALCulate:STATe□ON) and select limit function (CALCulate:FUNCtion□AVERage) to run the command.

The standard deviation of statistical data can be queried at any time.

Return Format:

The query returns the standard deviation of statistical data.

Configure Commands

The commands are used to set basic measuring functions and related parameters, such as range and accuracy.

Which mainly include:

- CONFigure?
- CONFigure:CAPacitance
- CONFigure:CONTinuity
- CONFigure:CURRent:AC
- CONFigure:CURRent[:DC]
- CONFigure:DIODe
- CONFigure:FREQuency
- CONFigure:FRESistance
- CONFigure:PERiod
- CONFigure:RESistance
- CONFigure[:VOLTage]:AC
- CONFigure[:VOLTage][:DC]

1. CONFigure?

Command Format:
CONFigure?

Function:
The command queries the current configuration of instrument.

Return Format:
The query returns the character string of instrument configuration. And it consist of three parts: <function>, <resolution>, <range>. For example: VOLT:DC 0.200000 1000.000000.
<function> may be "VOLT:DC", "VOLT:AC", "CURR:DC", "CURR:AC", "RES", "FRES", "CAP", "CONT", "DIODE", "FREQ", "PER".

2. CONFigure:CAPacitance

Command Format:
CONFigure:CAPacitance□
[{<range>|AUTO|MIN|MAX|DEF} [,{<resolution>|MIN|MAX|DEF}]]

Function:
The command resets the capacitance parameters and trigger parameters as defaults, and sets capacitance measuring function.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{2 nF | 20 nF | 200 nF | 2 μF | 20 μF| 10000 μF}	Switch to autorange
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:
<range> may be 2 nF (MIN), 20 nF, 200 nF, 2 μF, 20 μF, 200 μF, 10000 μF (MAX), AUTO (autorange) (unit is F). MAX = 0.01, MIN = 0.000 000 002, DEF=0.000 002.
<resolution> (unit is F); in default setting, the rate is medium.

3. CONFigure:CONTinuity

Command Format:

CONFigure:CONTinuity

Function:

The command resets all the continuity measuring parameters and trigger parameter as defaults, and sets continuity measuring function.

Explanations:

Enable continuity test, and set the range as 2 kΩ.

4. CONFigure:CURRent:AC

Command Format:

CONFigure:CURRent:AC□
[{<range>|AUTO|MIN|MAX|DEF} [,{<resolution>|MIN|MAX|DEF}]]

Function:

The command resets all the AC current measuring parameters and trigger parameters as defaults, and sets AC current measuring function.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{ 20 mA |200 mA | 2 A | 10 A }	200 mA
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:

<range> may be 20 mA (MIN), 200 mA, 2 A, 10 A (MAX), AUTO (autorange) (unit is A). MAX = 10, MIN = 0. 02.
<resolution> (unit is A); in default setting, the rate is medium.

5. CONFigure:CURRent[:DC]

Command Format:

CONFigure:CURRent[:DC]□
[{<range>|AUTO|MIN|MAX|DEF} [,{<resolution>|MIN|MAX|DEF}]]

Function:

The command resets all the DC current measuring parameters and trigger parameters as defaults, and sets DC current measuring function.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{ 200 μA | 2 mA | 20 mA | 200 mA | 2 A | 10 A }	200 mA
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:

<range> may be 200 μA (MIN), 2 mA, 20 mA, 200 mA, 2 A, 10 A (MAX), AUTO (autorange) (unit is A). MAX = 10, MIN = 0. 000 2.

<resolution> (unit is A); in default setting, the rate is medium.

6. CONFigure:DIODe

Command Format:

CONFigure:DIODe

Function:

The command resets all the diode measuring parameters and trigger parameters as defaults, and sets diode measuring function.

7. CONFigure:FREQuency

Command Format:

CONFigure:FREQuency□

[{<range>|MIN|MAX|DEF} [,{<resolution>|MIN|MAX|DEF}]]

Function:

The command resets all the frequency measuring parameters and trigger parameters as defaults, and sets frequency measuring function.

Parameters:

Name	Type	Range of Values	Default
<range>	Consecutive Integer	20 Hz~1 MHz	switching to autorange
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:

<range> may be 20 Hz~1 MHz (unit is Hz). MAX = 1 000 000, MIN = 20, DEF is autorange.

<resolution> (unit is Hz); in default setting, the rate is medium.

8. CONFigure:FRESistance

Command Format:

CONFigure:FRESistance□

[{<range>|AUTO|MIN|MAX|DEF} [,{<resolution>|MIN|MAX|DEF}]]

Function:

The command resets all the 4-wire resistance measuring parameters and trigger parameters as defaults, and sets 4-wire resistance measuring function.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{200 Ω | 2 kΩ | 20 kΩ | 200 kΩ | 2 MΩ | 10 MΩ | 100 MΩ}	2 kΩ
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:

<range> may be 200 Ω (MIN), 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ, 10 MΩ, 100 MΩ (MAX), AUTO (autorange) (unit is Ω). MAX = 100 000 000, MIN = 200.

<resolution> (unit is Ω); in default setting, the rate is medium.

9. CONFigure:PERiod

Command Format:

CONFigure:PERiod□[{<range>|MIN|MAX|DEF}[,{<resolution>|MIN|MAX|DEF}]]

Function:

The command resets all the period measuring parameters and trigger parameters as defaults, and sets period measuring function.

Parameters:

Name	Type	Range of Vaules	Default
<range>	Consecutive Integer	1 μs~50 ms	50 ms
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:

<range> may be 1 μs~50 ms (unit is s). MAX = 0.05, MIN = 0.000001, DEF = 0.05.

<resolution> (unit is Hz); in default setting, the rate is medium.

10. CONFigure:RESistance

Command Format:

CONFigure:RESistance□

[{<range>|AUTO|MIN|MAX|DEF} [,{<resolution>|MIN|MAX|DEF}]]

Function:

The command resets all the 2-wire resistance measuring parameters and trigger parameters as defaults, and sets 2-wire resistance measuring function.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{200 Ω | 2 kΩ | 20 kΩ | 200 kΩ | 2 MΩ | 10 MΩ | 100 MΩ}	2 kΩ
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:

<range> may be 200 Ω (MIN), 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ, 10 MΩ, 100 MΩ (MAX), AUTO (autorange) (unit is Ω). MAX = 100 000 000, MIN = 200.

<resolution> (unit is Ω); in default setting, the rate is medium.

11. CONFigure[:VOLTage]:AC

Command Format:

CONFigure[:VOLTage]:AC□
[{<range>|AUTO|MIN|MAX|DEF} [,{<resolution>|MIN|MAX|DEF}]]

Function:

The command resets all the AC voltage measuring parameters and trigger parameters as defaults, and sets AC voltage measuring function.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{ 200 mV | 2 V | 20 V | 200 V | 750 V }	20 V
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:

<range> may be 200 mV (MIN), 2 V, 20 V, 200 V, 750 V (MAX) AUTO (autorange) (unit is V). MAX = 750, MIN = 0. 2.
<resolution> (unit is V); in default setting, the rate is medium.

12. CONFigure[:VOLTage][:DC]

Command Format:

CONFigure[:VOLTage][:DC]□
[{<range>|AUTO|MIN|MAX|DEF} [,{<resolution>|MIN|MAX|DEF}]]

Function:

The command resets all the DC voltage measuring parameters and trigger parameters as defaults, and sets DC voltage measuring function.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{200 mV | 2 V | 20 V | 200 V | 1000 V}	20 V
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:

<range> may be 200 mV (MIN), 2 V, 20 V, 200 V, 1000 V (MAX), AUTO (autorange) (unit is V). MAX = 1000, MIN = 0. 2.

<resolution> (unit is V); in default setting, the rate is medium.

Data Commands

The commands are used to read the data from non-volatile memory, and do quering and deletion.

Which mainly include:

- DATA:DATA?□NVMEM
- DATA:DELete□NVMEM
- DATA:LAST?
- DATA:POINts?□NVMEM
- DATA:REMove?

1. DATA:DATA?□NVMEM

Command Format:
DATA:DATA?□NVMEM

Function:
The command queries the data in non-volatile memory.

Return Format:
The query returns the data in non-volatile memory.

2. DATA:DELete□NVMEM

Command Format:
DATA:DELete□NVMEM

Function:
The command deletes the data from non-volatile memory.

3. DATA:LAST?

Command Format:
DATA:LAST?

Function:
The command queries the last test result.

Return Format:
The query returns the last test result.

4. DATA:POINts?□NVMEM

Command Format:
DATA:POINts?□NVMEM

Function:

The command queries the number of data saved in non-volatile memory.

Return Format:

The query returns the number of data saved in non-volatile memory.

5. DATA:REMove?

Command Format:

DATA:REMove?□<num_readings>

Function:

The command reads and removes the specified number of data from memory.

Parameters:

Name	Type	Range of Values	Default
<num_readings>	Discrete	The specified number, not beyond "points".	Required parameter

Explanations:

<num_readings> must be set in the command, and can't greater than the return value of **DATA:POINts?□NVMEM**, or be a error.

Return Format:

The query returns the specified number of data in memory.

Fetch Commands

The commands are used to read the data from output buffer of multimeter.

Which mainly include:

- FETCh?
- FETCh:CURRent:AC:PTPeak?
- FETCh:CURRent[:DC]:PEAK:MAXimum?
- FETCh:CURRent[:DC]:PEAK:MINimum?
- FETCh:CURRent[:DC]:PTPeak?
- FETCh:VOLTage:AC:PTPeak?
- FETCh:VOLTage[:DC]:PEAK:MAXimum?
- FETCh:VOLTage[:DC]:PEAK:MINimum?
- FETCh:VOLTage[:DC]:PTPeak?

1. FETCh?

Command Format:
FETCh?

Function:
The command queries the data in output buffer, and reads them for computer.

Explanation:
The command will stop the operation until the completion of measuring command.

Return Format:
The query returns the data in output buffer.

2. FETCh:CURRent:AC:PTPeak?

Command Format:
FETCh:CURRent:AC:PTPeak?

Function:
The command queries the difference between the highest and lowest AC transient current.

Explanations:
Before sending the command, please enable the AC current measuring function, and enble ACI peak-to-peak measuring function with the command "[SENSe:] CURRent:AC:PEAK:STATe□ON".

Return Format:
The query returns the peak-to-peak value in ACI measurement.

3. FETCh:CURRent[:DC]:PEAK:MAXimum?

Command Format:
FETCh:CURRent[:DC]:PEAK:MAXimum?

Function:

The command queries max transient current in DCI measurement.

Explanations:

Before sending the command, please enable DC current measuring function, and enble DCI peak-to-peak measuring function with the command "[SENSe:] CURRent[:DC]:PEAK:STATe□ON".

Return Format:

The query returns max transient current in DCI measurement.

4. FETCh:CURRent[:DC]:PEAK:MINimum?

Command Format:

FETCh:CURRent[:DC]:PEAK:MINimum?

Function:

The command queries min transient current in DCI measurement.

Explanations:

Before sending the command, please enable DCcurrent measuring function, and enble DCI peak-to-peak measuring function with the command "[SENSe:] CURRent[:DC]:PEAK:STATe□ON".

Return Format:

The query returns min transient current in DCI measurement.

5. FETCh:CURRent[:DC]:PTPeak?

Command Format:

FETCh:CURRent[:DC]:PTPeak?

Function:

The command queries the difference between the highest and lowest DC transient current.

Explanations:

Before sending the command, please enable DC current measuring function, and enble DCI peak-to-peak measuring function with the command "[SENSe:] CURRent[:DC]:PEAK:STATe□ON".

Return Format:
The query returns the peak-to-peak value in DCI measurement.

6. FETCh:VOLTage:AC:PTPeak?

Command Format:
FETCh:VOLTage:AC:PTPeak?

Function:
The command queries the difference between the highest and lowest AC transient voltage.

Explanations:
Before sending the command, please enable AC voltage measuring function, and enble ACV peak-to-peak measuring function with the command "[SENSe:] VOLTage:AC:PEAK:STATe□ON".

Return Format:
The query returns the peak-to-peak value in ACV measurement.

7. FETCh:VOLTage[:DC]:PEAK:MAXimum?

Command Format:
FETCh:VOLTage[:DC]:PEAK:MAXimum?

Function:
The command queries max transient voltage in DCV measurement.

Explanations:
Before sending the command, please enable DC voltage measuring function, and enable DCV peak-to-peak measuring function with the command "[SENSe:] VOLTage[:DC]:PEAK:STATe□ON".

Return Format:
The query returns max transient voltage in DCV measurement.

8. FETCh:VOLTage[:DC]:PEAK:MINimum?

Command Format:
FETCh:VOLTage[:DC]:PEAK:MINimum?

Function:
The command queries min transient voltage in DCV measurement.

Explanations:
Before sending the command, please enable DC voltage measuring function, and enble DCV peak-peak measuring function with the command "[SENSe:] VOLTage[:DC]:PEAK:STATe□ON".

Return Format:
The query returns min transient voltage in DCV measurement.

9. FETCh:VOLTage[:DC]:PTPeak?

Command Format:
FETCh:VOLTage[:DC]:PTPeak?

Function:
The command queries the difference between the highest and lowest DC transient voltage.

Explanations:
Before sending the command, please enable DC voltage measuring function, and enable DCV peak-to-peak measuring function with the command "[SENSe:] VOLTage[:DC]:PEAK:STATe□ON".

Return Format:
The query returns the peak-to-peak value in DCV measurement.

Measure Commands

The commands are used to enable basic measuring function, and have the same function with the selection keys in front panel.

Which mainly include:

- MEASure:CAPacitance?
- MEASure:CONTinuity?
- MEASure:CURRent:AC?
- MEASure:CURRent[:DC]?
- MEASure:DIODe?
- MEASure:FREQuency?
- MEASure:FRESistance?
- MEASure:PERiod?
- MEASure:RESistance?
- MEASure[:VOLTage]:AC?
- MEASure[:VOLTage][:DC]?

1. MEASure:CAPacitance?

Command Format:

MEASure:CAPacitance?□
[{<range>|AUTO|MIN|MAX|DEF} [,{<resolution>|MIN|MAX|DEF}]]

Function:

The command resets all the capacitance measuring parameters and trigger parameters as defaults, and sets capacitance measuring function, gets the measuring results and sends them to output buffer of instrument.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{2 nF | 20 nF | 200 nF| 2 μF | 20 μF | 200 μF| 10000 μF}	200 nF
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:

<range> may be 2 nF (MIN), 20 nF, 200 nF, 2 μF, 20 μF, 200 μF, 10000 μF (MAX), AUTO (autorange) (unit is F). MAX = 0.01, MIN = 0.000 000 002.
<resolution> (unit is F); in default setting, the rate is medium.

Return Format:

The query returns the data in output buffer.

2. MEASure:CONTinuity?

Command Format:

MEASure:CONTinuity?

Function:

The command resets all the continuity measuring parameters and trigger parameters as defaults, and sets continuity measuring function, get the measuring results and send them to output buffer of instrument.

Explanations:

Enable continuity measuring function, and set the range as 2 kΩ.

Return Format:

The query returns the data in ouput buffer.

3. MEASure:CURRent:AC?

Command Format:

MEASure:CURRent:AC?□

[{<range>|AUTO|MIN|MAX|DEF} [,{<resolution>|MIN|MAX|DEF}]]

Function:

The command resets all the AC current measuring parameters and trigger parameters as defaults, and sets AC current measuring function, get the measuring results and send them to output buffer of instrument.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{ 20 mA | 200 mA | 2 A | 10 A }	200 mA
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:

<range> may be 20 mA (MIN), 200 mA, 1 A, 10 A (MAX), AUTO (autorange) (unit is A). MAX = 10, MIN = 0. 02.

<resolution> (unit is A); in default setting, the rate is medium.

Return Format:

The query returns the data in output buffer.

4. MEASure:CURRent[:DC]?

Command Format:

MEASure:CURRent[:DC]?□

[{<range>|AUTO|MIN|MAX|DEF} [,{<resolution>|MIN|MAX|DEF}]]

Function:

The command resets all the DC current measuring parameters and trigger parameters as defaults, and sets DC current measuring function, gets the

measuring results and sends them to output buffer of instrument.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{ 200 μA | 2 mA | 20 mA | 200 mA | 2 A | 10 A }	200 mA
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:

<range> may be 200 μA (MIN), 2 mA, 20 mA, 200 mA, 1 A, 10 A (MAX), AUTO (autorange) (unit is A). MAX = 10, MIN = 0. 000 2.

<resolution> (unit is A); in default setting, the rate is medium.

Return Format:

The query returns the data in output buffer.

5. MEASure:DIODe?

Command Format:

MEASure:DIODe?

Function:

The command resets all the diode measuring parameters and trigger parameters as defaults, and sets diode measuring function, gets the measuring results and sends them to output buffer of instrument.

Return Format:

The query returns the data in output buffer.

6. MEASure:FREQuency?

Command Format:

MEASure:FREQuency?□

[{<range>|MIN|MAX|DEF} [,{<resolution>|MIN|MAX|DEF}]]

Function:

The command resets all the frequency measuring parameters and trigger parameters as defaults, and sets frequency measuring function, gets the measuring results and sends them to output buffer of instrument.

Parameters:

Name	Type	Range of Values	Default
<range>	Consecutive Integer	20 Hz~1 MHz	20 Hz
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:

<range> may be 20 Hz~1 MHz (unit is Hz). MAX = 1 000 000, MIN = 20, DEF = 20.

<resolution> unit is Hz; in default setting, the rate is medium.

Return Format:

The query returns the data in output buffer.

7. MEASure:FRESistance?

Command Format:

MEASure:FRESistance?□

[{<range>|AUTO|MIN|MAX|DEF} [,{<resolution>|MIN|MAX|DEF}]]

Function:

The command resets all the 4-wire resistance measuring parameters and trigger parameters as defaults, and sets 4-wire resistance measuring function, get the measuring results and send them to output buffer of instrument.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{200 Ω | 2 kΩ | 20 kΩ | 200 kΩ | 2 MΩ | 10 MΩ | 100 MΩ}	2 kΩ
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:

<range> may be 200 Ω (MIN), 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ, 10 MΩ, 100 MΩ

(MAX), AUTO (autorange) (unit is Ω). MAX = 100 000 000, MIN = 200.
<resolution> (unit is Ω); in default setting, the rate is medium.

Return Format:
The query returns the data in output buffer.

8. MEASure:PERiod?

Command Format:
MEASure:PERiod?□[{<range>|MIN|MAX|DEF} [,{<resolution>|MIN|MAX|DEF}]]

Function:
The command resets all the period measuring parameters and trigger parameters as defaults, and sets period measuring function, gets the measuring results and sends them to output buffer of instrument.

Parameters:

Name	Type	Range of Values	Default
<range>	Consecutive Integer	1 μs~50 ms	50 ms
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:
<range> may be 1 μs~50 ms (unit is s). MAX = 0.05, MIN = 0.000001, DEF = 0.05.
<resolution> (unit is A); in default setting, the rate is medium.

Return Format:
The query returns the data in output buffer.

9. MEASure:RESistance?

Command Format:
MEASure:RESistance?□
[{<range>|AUTO|MIN|MAX|DEF} [,{<resolution>|MIN|MAX|DEF}]]

Function:

The command resets all the 2-wire resistance measuring parameters and trigger parameters as defaults, and sets 2-wire resistance measuring function, get the measuring results and send them to output buffer of instrument.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{200 Ω | 2 kΩ | 20 kΩ | 200 kΩ | 2 MΩ | 10 MΩ | 100 MΩ}	200 kΩ
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:

<range> may be 200 Ω (MIN), 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ, 10 MΩ, 100 MΩ (MAX), AUTO (autorange) (unit is Ω). MAX = 100 000 000, MIN = 200.
In default setting of <resolution>, the rate is medium.

Return Format:

The query returns the data in output buffer.

10. MEASure[:VOLTage]:AC?

Command Format:

MEASure[:VOLTage]:AC?□
[{<range>|AUTO|MIN|MAX|DEF} [,{<resolution>|MIN|MAX|DEF}]]

Function:

The command resets all the AC voltage measuring parameters and trigger parameters as defaults, and sets AC voltage measuring function, gets the measuring results and sends them to output buffer of instrument.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{ 200 mV | 2 V | 20 V | 200 V | 750 V }	20 V
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:

<range> may be 200 mV (MIN), 2 V, 20 V, 200 V, 750 V (MAX), AUTO (autorange) (unit is V). MAX = 750, MIN = 0. 2.
<resolution> (unit is V); in default setting, the rate is medium.

Return Format:
The query returns the data in output buffer.

11. MEASure[:VOLTage][:DC]?

Command Format:
MEASure[:VOLTage][:DC]?□
[{<range>|AUTO|MIN|MAX|DEF} [,{<resolution>|MIN|MAX|DEF}]]

Function:
The command resets all the DC voltage measuring parameters and trigger parameters as defaults, and sets DC voltage measuring function, gets the measuring results and sends them to output buffer of instrument.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{200 mV | 2 V | 20 V | 200 V | 1000 V}	20 V
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:
<range> may be 200 mV (MIN), 2 V, 20 V, 200 V, 1000 V (MAX), AUTO (autorange) (unit is V). MAX = 1000, MIN = 0. 2.
<resolution> (unit is V); in default setting, the rate is medium.

Return Format:
The query returns the data in output buffer.

Memory Commands

The commands are used to access the data in memory, and do quering and deletion.

Which mainly include:

- MEMory:NSTates?
- MEMory:STATe:CATalog?
- MEMory:STATe:DELete
- MEMory:STATe:DELete:ALL
- MEMory:STATe:NAME
- MEMory:STATe:RECall:AUTO
- MEMory:STATe:RECall:SELect
- MEMory:STATe:VALid

1. MEMory:NSTates?

Command Format:
MEMory:NSTates?

Function:
The command queries the number of available memory location.

Return Format:
The query returns the number of available memory location.

2. MEMory:STATe:CATalog?

Command Format:
MEMory:STATe:CATalog?

Function:
The command queries the name of memory location (1 to 5).

Return Format:
The query returns the name of memory location (1 to 5).

3. MEMory:STATe:DELete

Command Format:
MEMory:STATe:DELete□{1|2|3|4|5}

Function:
The command deletes the data from the selected memory location.

Explanations:
The factory setting can't be deleted.
If the data in the selected memory location have been deleted, it will lead to a error for trying to restore the data.

4. MEMory:STATe:DELete:ALL

Command Format:
MEMory:STATe:DELete:ALL

Function:
The command deletes the data of all memory location.

Explanations:
The factory setting can't be deleted, it can be restored after re-power on.
If the data in the selected memory location have been deleted, it will lead to a error for trying to restore the data.

5. MEMory:STATe:NAME

Command Format:
MEMory:STATe:NAME□{1|2|3|4|5} [,<name>]
MEMory:STATe:NAME?□{1|2|3|4|5}

Function:
The command sets or queries the name of specified memory location.

Parameters:

Name	Type	Range of Values
<name>	ASCII Character String	It consists of characters, digits and underlines.

Explanations:
MEMory:STATe:NAME□{1|2|3|4|5}[,<name>]: Set the name of specified memory location. <name> is optional parameter. If <name> is not set, its default is "STATE_location" (location is the serial number of memory location; for example, for the first memory location, the default name is "STATE_1").
MEMory:STATe:NAME?□{1|2|3|4|5}: Query the name of specified memory location.

Return Format:
The query returns the name of specified memory location.

6. MEMory:STATe:RECall:AUTO

Command Format:

MEMory:STATe:RECall:AUTO□{ON|OFF}

MEMory:STATe:RECall:AUTO?

Function:

The command sets or queries the enable state of automatic recall of a specific stored instrument state when power is on.

Explanations:

MEMory:STATe:RECall:AUTO□{ON|OFF}: Enable or disable the automatic recall function.

MEMory:STATe:RECall:AUTO?: Query the enable state of the automatic recall function.

Return Format:

The query returns the enable state of automatic recall function.

7. MEMory:STATe:RECall:SELect

Command Format:

MEMory:STATe:RECall:SELect□{1|2|3|4|5}

MEMory:STATe:RECall:SELect?

Function:

The command sets or queries the state information of instrument at power on if the automatic recall function is enabled.

Explanations:

Before sending the command, do enable automatic recall function (MEMory: STATe:RECall:AUTO□ON).

MEMory:STATe:RECall:SELect □ {1|2|3|4|5}: Select the instrument state in specified memory.

MEMory:STATe:RECall:SELect?: Query the serial number of memory the selected instrument state is stored in.

Return Format:

The query returns the serial number of memory the selected instrument state is stored in.

8. MEMory:STATe:VALid

Command Format:

MEMory:STATe:VALid?□{1|2|3|4|5}

Function:

The command queries if the available state information can be stored in specified memory location.

Explanation:

The command **"*RCL"** can be used to query if the specified memory location has data.

Return Format:

The query returns 1 or 0, 1 denotes "valid"; 0 denotes "invalid".

Output Commands

The commands are used to set trigger mode for output signal as rising edge or falling edge.

Which mainly includes:

- OUTPut:TRIGger:SLOPe

1. OUTPut:TRIGger:SLOPe

Command Format:

OUTPut:TRIGger:SLOPe□{POSitive|NEGative}
OUTPut:TRIGger:SLOPe?

Function:

The command sets or queries the trigger mode for ouput signal.

Explanations:

OUTPut:TRIGger:SLOPe□{POSitive|NEGative}: Set the trigger mode for ouput signal as rising edge (POSitive) or falling edge (NEGative).
OUTPut:TRIGger:SLOPe?: Query the trigger mode for ouput signal.

Return Format:

The query returns the parameter related to trigger mode: POSitive or NEGative.

Sample Commands

The commands are used to set trigger parameters, such as sample times, delayed time.

Which mainly include:

- SAMPle:SOURce
- SAMPle:TIMer

1. SAMPle:SOURce

Command Format:

SAMPle:SOURce□{IMMediate|TIMer}
SAMPle:SOURce?

Function:

The command sets or queries the trigger type for sampling.

Explanations:

The command "SAMPle:SOURce□{IMMediate|TIMer}" should be used together with the command "TRIGger:DELay" and "SAMPle:TIMer". When sample numbers are greater than 1, sample time can be determined; when sample number is 1, the command is invalid.
SAMPle:SOURce?: Query the trigger type, including auto trigger (IMMediate) or interval trigger (TIMer).
It is suggested that accurate range should be set by manual not by auto in all trigger command.

Return Foramt:

The query returns the parameter related to trigger type: IMMediate or TIMer.

2. SAMPle:TIMer

Command Format:

SAMPle:TIMer□{<interval>|MIN|MAX}
SAMPle:TIMer?□[{MIN|MAX}]

Function:

The command sets or queries the sample interval time.

Parameters:

Name	Type	Range of Values	Default
<interval>	Consecutive Real Number	0.4~3600	Required parameter

Explanations:

SAMPle:TIMer□{<interval>|MIN|MAX}: Set the sample interval time. MAX =

3600 s, MIN is determined by measuring function. In DC measurement, MIN is almost 20 μs; in AC measurement, MIN is determined by bandwidth.

SAMPle:TIMer?□[{MIN|MAX}]: Query the sample interval time.

It is suggested that accurate range should be set by manual not by auto in all trigger command.

Return Foramt:

The query returns the sample interval time.

Sense Commands

The commands are used to set parameters of measuring functions, such as NULL value, range, accuracy, interval time, and enable state of measuring function.

Which mainly include:

- [SENSe:]FUNCtion[:ON]

- [SENSe:]CURRent:AC:NULL[:STATe]
- [SENSe:]CURRent:AC:NULL:VALue
- [SENSe:]CURRent:AC:PEAK:STATe
- [SENSe:]CURRent:AC:RANGe:AUTO
- [SENSe:]CURRent:AC:RANGe[:UPPer]

- [SENSe:]CURRent[:DC]:APERture
- [SENSe:]CURRent[:DC]:APERture:ENABled
- [SENSe:]CURRent[:DC]:NPLC
- [SENSe:]CURRent[:DC]:NULL[:STATe]
- [SENSe:]CURRent[:DC]:NULL:VALue
- [SENSe:]CURRent[:DC]:PEAK:STATe
- [SENSe:]CURRent[:DC]:RANGe:AUTO
- [SENSe:]CURRent[:DC]:RANGe[:UPPer]
- [SENSe:]CURRent[:DC]:RESolution
- [SENSe:]CURRent[:DC]:ZERO:AUTO

- [SENSe:]VOLTage:AC:NULL[:STATe]
- [SENSe:]VOLTage:AC:NULL:VALue
- [SENSe:]VOLTage:AC:PEAK:STATe
- [SENSe:]VOLTage:AC:RANGe:AUTO
- [SENSe:]VOLTage:AC:RANGe[:UPPer]

- [SENSe:]VOLTage[:DC]:APERture
- [SENSe:]VOLTage[:DC]:APERture:ENABled
- [SENSe:]VOLTage[:DC]:IMPedance:AUTO
- [SENSe:]VOLTage[:DC]:NPLC
- [SENSe:]VOLTage[:DC]:NULL[:STATe]
- [SENSe:]VOLTage[:DC]:NULL:VALue

- [SENSe:]VOLTage[:DC]:PEAK:STATe
- [SENSe:]VOLTage[:DC]:RANGe:AUTO
- [SENSe:]VOLTage[:DC]:RANGe[:UPPer]
- [SENSe:]VOLTage[:DC]:RESolution
- [SENSe:]VOLTage[:DC]:ZERO:AUTO

- [SENSe:]RESistance:APERture
- [SENSe:]RESistance:APERture:ENABled
- [SENSe:]RESistance:NPLC
- [SENSe:]RESistance:NULL[:STATe]
- [SENSe:]RESistance:NULL:VALue
- [SENSe:]RESistance:OCOMpensated
- [SENSe:]RESistance:RANGe:AUTO
- [SENSe:]RESistance:RANGe[:UPPer]
- [SENSe:]RESistance:RESolution
- [SENSe:]RESistance:ZERO:AUTO

- [SENSe:]FRESistance:APERture
- [SENSe:]FRESistance:APERture:ENABled
- [SENSe:]FRESistance:NPLC
- [SENSe:]FRESistance:NULL[:STATe]
- [SENSe:]FRESistance:NULL:VALue
- [SENSe:]FRESistance:OCOMpensated
- [SENSe:]FRESistance:RANGe:AUTO
- [SENSe:]FRESistance:RANGe[:UPPer]
- [SENSe:]FRESistance:RESolution

- [SENSe:]FREQuency:APERture
- [SENSe:]FREQuency:NULL[:STATe]
- [SENSe:]FREQuency:NULL:VALue
- [SENSe:]FREQuency:VOLTage:RANGe:AUTO
- [SENSe:]FREQuency:VOLTage:RANGe[:UPPer]

- [SENSe:]PERiod:APERture
- [SENSe:]PERiod:NULL[:STATe]
- [SENSe:]PERiod:NULL:VALue
- [SENSe:]PERiod:VOLTage:RANGe:AUTO

- [SENSe:]PERiod:VOLTage:RANGe[:UPPer]

- [SENSe:]CAPacitance:NULL[:STATe]
- [SENSe:]CAPacitance:NULL:VALue
- [SENSe:]CAPacitance:RANGe:AUTO
- [SENSe:]CAPacitance:RANGe[:UPPer]

1. [SENSe:]FUNCtion[:ON]

Command Format:

[SENSe:]FUNCtion[:ON]□"<function>"

[SENSe:]FUNCtion[:ON]?

Function:

The command selects or queries measuring function.

Parameters:

Name	Type	Range of Values	Default
<function>	Discrete	{ 'volt:dc' | 'volt:ac' | 'curr:ac' | 'curr:dc' | 'freq' | 'per' | 'cap' | 'res' | 'fres' | 'cont' | 'diod' }	Required parameter

Explanations:

[SENSe:]FUNCtion[:ON] □ "<function>": Select the measuring function for instrument, the parameter enclosed by single quotation marks (') is a character string related to measuring function. And the default is inexsitent, <function> must be set. See table 5-2.

[SENSe:]FUNCtion[:ON]?: Query current measuring function.

Table 5-2 The parameters and their meanings

Parameter	Meaning	Parameter	Meaning
'volt:dc'	DCV	'cap'	capacitance
'volt:ac'	ACV	'res'	2WR
'curr:ac'	ACI	'fres'	4WR
'curr:dc'	DCI	'cont'	Continuity
'freq'	Frequency	'diod'	Diode
'per'	Period		

Return Format:

The query returns the parameter related to current measuring function.

2. [SENSe:]CURRent:AC:NULL[:STATe]

Command Format:

[SENSe:]CURRent:AC:NULL[:STATe]□{ON|OFF}
[SENSe:]CURRent:AC:NULL[:STATe]?

Function:
The command sets or queries the enable state of ACI NULL function.

Explanations:
[SENSe:]CURRent:AC:NULL[:STATe]□{ON|OFF}: Enable or disable ACI NULL function.
[SENSe:]CURRent:AC:NULL[:STATe]?: Query the enable state of ACI NULL function.
The command "[SENSe:]CURRent:AC:NULL:VALue" can be used to set NULL value.
The commands "CONFigure:CURRent:AC" and "MEASure:CURRent:AC?" can disable NULL function (OFF).

Return Format:
The query returns the enable state of ACI NULL function.

3. [SENSe:]CURRent:AC:NULL:VALue

Command Format:
[SENSe:]CURRent:AC:NULL:VALue□{<value>|MIN|MAX}
[SENSe:]CURRent:AC:NULL:VALue?□[{MIN|MAX}]

Function:
The command sets or queries the NULL value of ACI measurement.

Parameters:

Name	Type	Range of Values	Default
<value>	Discrete	±120% max range	0

Explanations:
[SENSe:]CURRent:AC:NULL:VALue□{<value>|MIN|MAX}: Set the NULL value of ACI measurement. MIN is -120% max range of current function, MAX is 120% max range of current function, DEF = 0.
[SENSe:]CURRent:AC:NULL:VALue?□[{MIN|MAX}]: Query the NULL value of

ACI measurement.
Before sending the command, run the command "[SENSe:]CURRent:AC:NULL [:STATe]□ON" to enable NULL function.

Return Format:
The query returns the NULL value of ACI measurement.

4. [SENSe:]CURRent:AC:PEAK:STATe

Command Format:
[SENSe:]CURRent:AC:PEAK:STATe□{ON|OFF}
[SENSe:]CURRent:AC:PEAK:STATe?

Function:
The command sets or queries the enable state of ACI peak-to-peak measuring function.

Explanations:
[SENSe:]CURRent:AC:PEAK:STATe □ {ON|OFF}: Enable or disable ACI peak-to-peak measuring function.
[SENSe:]CURRent:AC:PEAK:STATe?: Query the enable state of ACI peak-to-peak measuring function.
The command "[SENSe:]CURRent:AC:NULL:VALue" can be used to set the ACI peak-to-peak value.

Return Format:
The command returns the enable state of ACI peak-to-peak measuring function.

5. [SENSe:]CURRent:AC:RANGe:AUTO

Command Format:
[SENSe:]CURRent:AC:RANGe:AUTO□{ON|OFF}
[SENSe:]CURRent:AC:RANGe:AUTO?

Function:
The command sets or queries the enable state of ACI autorange function.

Explanations:

[SENSe:]CURRent:AC:RANGe:AUTO □ {ON|OFF}: Enable or disable ACI autorange function. If autorange function is ON, the measuring range will be selected automatically according to input signal.

[SENSe:]CURRent:AC:RANGe:AUTO?: Query the enable state of ACI autorange function.

Return Format:

The query returns the enable state of ACI autorange function.

6. [SENSe:]CURRent:AC:RANGe[:UPPer]

Command Format:

[SENSe:]CURRent:AC:RANGe[:UPPer]□{<range>|MIN|MAX|DEF}

[SENSe:]CURRent:AC:RANGe[:UPPer]?□[{MIN|MAX}]

Function:

The command sets or queries the range of ACI measurement.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{ 20 mA | 200 mA | 2 A | 10 A }	200 mA

Explanations:

[SENSe:]CURRent:AC:RANGe[:UPPer] □ {<range>|MIN|MAX|DEF}: Set the range of ACI measurement. <range> may be 20 mA, 200 mA, 2 A or 10 A. MIN = 20 mA, MAX = 10 A. Unit is A, so "200 mA" should be input in form of 0.2.

[SENSe:]CURRent:AC:RANGe[:UPPer]?□[{MIN|MAX}]: Query the range of ACI measurement.

Return Format:

The query returns current range of ACI measurement.

7. [SENSe:]CURRent[:DC]:APERture

Command Format:

[SENSe:]CURRent[:DC]:APERture□{<seconds>|MIN|MAX|DEF}

[SENSe:]CURRent[:DC]:APERture?□[{MIN|MAX}]

Function:

The command sets or queries the interval time of DCI measurement.

Parameters:

Name	Type	Range of Values	Default
<seconds>	Consecutive Integer	MIN = 400 mS, MAX = 2 s	400 ms

Explanations:

[SENSe:]CURRent[:DC]:APERture □ {<seconds>|MIN|MAX|DEF}: Set the interval time of DCI measurement. Unit is s, so "400" ms should be input in form of 0.4.

[SENSe:]CURRent[:DC]:APERture?□[{MIN|MAX}]: Query the interval time of DCI measurement.

Return Format:

The query returns the interval time of DCI measurement.

8. [SENSe:]CURRent[:DC]:APERture:ENABled

Command Format:

[SENSe:]CURRent[:DC]:APERture:ENABled□{ON|OFF}

[SENSe:]CURRent[:DC]:APERture:ENABled?

Function:

The command sets or queries the enable state of DCI interval time function.

Explanations:

[SENSe:]CURRent[:DC]:APERture:ENABled□{ON|OFF}: Enable or disable DCI interval time function.

[SENSe:]CURRent[:DC]:APERture:ENABled?: Query the enable state of DCI interval time function.

The commands "CONFigure:CURRent:DC", "MEASure:CURRent:DC?", "[SENSe:] CURRent[:DC]:NPLC" and "[SENSe:]CURRent[:DC]:RESolution" are used together to disable DCI interval time function (OFF).

Return Format:

The query returns the enable state of DCI interval time function.

9. [SENSe:]CURRent[:DC]:NPLC

Command Format:

[SENSe:]CURRent[:DC]:NPLC□{<PLCs>|MIN|MAX|DEF}

[SENSe:]CURRent[:DC]:NPLC?□[{MIN|MAX}]

Function:

The command sets or queries the interval time of DCI measurement, input values and returned values are both multiples of PLC.

Parameters:

Name	Type	Range of Values	Default
<PLCs>	Discrete	{0.006|0.02|0.06|0.2|1|2|10|100}	1 PLC

Explanations:

[SENSe:]CURRent[:DC]:NPLC□{<PLCs>|MIN|MAX|DEF}: Set the interval time of DCI measurement, input values is multiples of PLC. <PLCs> may be 0.006, 0.02, 0.06, 0.2, 1, 2, 10 or 100; MIN = 0.006 PLC; MAX = 100 PLC.

[SENSe:]CURRent[:DC]:NPLC?□[{MIN|MAX}]: Query the interval time of DCI measurement, returned values is multiples of PLC.

Return Format:

The query returns the interval time of DCI measurement which is multiples of PLC.

10. [SENSe:]CURRent[:DC]:NULL[:STATe]

Command Format:

[SENSe:]CURRent[:DC]:NULL[:STATe]□{ON|OFF}

[SENSe:]CURRent[:DC]:NULL[:STATe]?

Function:

The command sets or queries the enable state of DCI NULL function.

Explanations:

[SENSe:]CURRent[:DC]:NULL[:STATe]□{ON|OFF}: Enable or disable DCI NULL function.

[SENSe:]CURRent[:DC]:NULL[:STATe]?: Query the enable state of DCI NULL function.

The command "[SENSe:]CURRent[:DC]:NULL:VALue" can be used to set NULL value.

The commands "CONFigure:CURRent:DC" and "MEASure:CURRent:DC?" can disable NULL function (OFF).

Return Format:

The query returns the enable state of DCI NULL function.

11. [SENSe:]CURRent[:DC]:NULL:VALue

Command Format:

[SENSe:]CURRent[:DC]:NULL:VALue□{<value>|MIN|MAX}

[SENSe:]CURRent[:DC]:NULL:VALue?□[{MIN|MAX}]

Function:

The command sets or queries the NULL value of DCI measurement.

Parameters:

Name	Type	Range of Values	Default
<value>	Discrete	±120% max range	0

Explanations:

[SENSe:]CURRent[:DC]:NULL:VALue □ {<value>|MIN|MAX}: Set the NULL valueof DCI measurement. MIN is -120% max range of current function, MAX is 120% max range of current function, DEF = 0.

[SENSe:]CURRent[:DC]:NULL:VALue?□[{MIN|MAX}]: Query the NULL value of DCI measurement.

Before sending the command, do run the command "[SENSe:]CURRent[:DC]: NULL[:STATe]□ON" to enable NULL function.

Return Format:

The query returns the NULL value of DCI measurement.

12. [SENSe:]CURRent[:DC]:PEAK:STATe

Command Format:

[SENSe:]CURRent[:DC]:PEAK:STATe□{ON|OFF}

[SENSe:]CURRent[:DC]:PEAK:STATe?

Function:

The command sets or queries the enable state of DCI peak-to-peak measuring function.

Explanations:

[SENSe:]CURRent[:DC]:PEAK:STATe □ {ON|OFF}: Enable or disable DCI peak-to-peak measuring function.

[SENSe:]CURRent[:DC]:PEAK:STATe?: Query the enable state of DCI peak-to-peak measuring function.

The command "[SENSe:]CURRent[:DC]:NULL:VALue" can used to set DCI peak-peak value.

Return Format:

The query returns the enable state of DCI peak-to-peak measuring function.

13. [SENSe:]CURRent[:DC]:RANGe:AUTO

Command Format:

[SENSe:]CURRent[:DC]:RANGe:AUTO□{ON|OFF}

[SENSe:]CURRent[:DC]:RANGe:AUTO?

Function:

The command sets or queries the enable state of DCI autorange function.

Explanations:

[SENSe:]CURRent[:DC]:RANGe:AUTO □ {ON|OFF}: Enable or disable DCI autorange function. If DCI autorange function is ON, the measuring range will be selected automatically according to input signal.

[SENSe:]CURRent[:DC]:RANGe:AUTO?: Query the enable state of DCI autorange function.

Return Format:

The command returns the enable state of DCI autorange function.

14. [SENSe:]CURRent[:DC]:RANGe[:UPPer]

Command Format:

[SENSe:]CURRent[:DC]:RANGe[:UPPer]□{<range>|MIN|MAX|DEF}
[SENSe:]CURRent[:DC]:RANGe[:UPPer]?□[{MIN|MAX}]

Function:

The command sets or queries the range of DCI measuring function.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{ 200 μA | 2 mA | 20 mA | 200 mA | 2 A | 10 A }	200 mA

Explanations:

[SENSe:]CURRent[:DC]:RANGe[:UPPer] □ {<range>|MIN|MAX|DEF}: Set the range of DCI measuring function. <range> may be 200 μA, 2 mA, 20 mA, 200 mA, 1 A, 10 A. MIN = 200 μA, MAX = 10 A. Unit is A, so "200 mA" should be input in the form of 0.2.
[SENSe:]CURRent[:DC]:RANGe[:UPPer]?□[{MIN|MAX}]: Query the range of DCI measuring function.

Return Format:

The query returns current range of DCI measuring function.

15. [SENSe:]CURRent[:DC]:RESolution

Command Format:

[SENSe:]CURRent[:DC]:RESolution□{<resolution>|MIN|MAX|DEF}
[SENSe:]CURRent[:DC]:RESolution?□[{MIN|MAX}]

Function:

The command sets or queries the resolution of DCI measurement.

Parameters:

Name	Type	Range of Values	Default
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:

[SENSe:]CURRent[:DC]:RESolution □ {<resolution>|MIN|MAX|DEF}: Set the resolution of DCI measurement. In default setting of <resolution>, the rate is medium.

[SENSe:]CURRent[:DC]:RESolution?□[{MIN|MAX}]: Query the resolution of DCI measurement.

Return Format:

The query returns current resolution of DCI measurement.

16. [SENSe:]CURRent[:DC]:ZERO:AUTO

Command Format:

[SENSe:]CURRent[:DC]:ZERO:AUTO□{ON|OFF}

[SENSe:]CURRent[:DC]:ZERO:AUTO?

Function:

The command sets or queries the enable state of DCI autozero function.

Explanations:

[SENSe:]CURRent[:DC]:ZERO:AUTO□{ON|OFF}: Enable or disable DCI autozero function.

[SENSe:]CURRent[:DC]:ZERO:AUTO?: Query the enable state of DCI autozero function.

Return Format:

The query returns the enable state of DCI autozero function.

17. [SENSe:]VOLTage:AC:NULL[:STATe]

Command Format:

[SENSe:]VOLTage:AC:NULL[:STATe]□{ON|OFF}

[SENSe:]VOLTage:AC:NULL[:STATe]?

Function:
The command sets or queries the enable state of ACV NULL function.

Explanations:
[SENSe:]VOLTage:AC:NULL[:STATe]□{ON|OFF}: Enable or disable ACV NULL function.
[SENSe:]VOLTage:AC:NULL[:STATe]?: Query the enable state of ACV NULL function.
The command "[SENSe:]VOLTage:AC:NULL:VALue" can be used to set NULL value.
The commands "CONFigure:CURRent:AC" and "MEASure:CURRent:AC?" can be used to disable NULL function.

Return Format:
The command returns the enable state of ACV NULL function.

18. [SENSe:]VOLTage:AC:NULL:VALue

Command Format:
[SENSe:]VOLTage:AC:NULL:VALue□{<value>|MIN|MAX}
[SENSe:]VOLTage:AC:NULL:VALue?□[{MIN|MAX}]

Function:
The command sets or queries the NULL value of ACV measurement.

Parameters:

Name	Type	Range of Values	Default
<value>	Discrete	±120% max range	0

Explanations:
[SENSe:]VOLTage:AC:NULL:VALue□{<value>|MIN|MAX}: Set the NULL value of ACV measurement. MIN is -120% max range of current function, MAX is 120% max function of current function, DEF = 0.
[SENSe:]VOLTage:AC:NULL:VALue?□[{MIN|MAX}]: Query the NULL value of ACV measurement.
Before sending the command, do run the command "[SENSe:]VOLTage:AC:NULL [:STATe]□ON" to enable NULL function.

Return Format:
The query returns the NULL value of ACV measurement.

19. [SENSe:]VOLTage:AC:PEAK:STATe

Command Format:
[SENSe:]VOLTage:AC:PEAK:STATe□{ON|OFF}
[SENSe:]VOLTage:AC:PEAK:STATe?

Function:
The command sets or queries the enable state of ACV peak-to-peak measuring function.

Explanations:
[SENSe:]VOLTage:AC:PEAK:STATe □ {ON|OFF}: Enable or disable ACV peak-to-peak measuring function.
[SENSe:]VOLTage:AC:PEAK:STATe?: Query the enable state of ACV peak-to-peak measuring function.
The command "[SENSe:]VOLTage:AC:NULL:VALue" can be used to set ACV peak-to-peak value.

Return Format:
The query returns the enable state of ACV peak-to-peak measuring function.

20. [SENSe:]VOLTage:AC:RANGe:AUTO

Command Format:
[SENSe:]VOLTage:AC:RANGe:AUTO□{ON|OFF}
[SENSe:]VOLTage:AC:RANGe:AUTO?

Function:
The command sets or queries the enable state of ACV autorange function.

Explanations:
[SENSe:]VOLTage:AC:RANGe:AUTO □ {ON|OFF}: Enable or disable ACV autorange function. If ACV autorange function is ON, the measuring range will be selected according to input signal.

[SENSe:]VOLTage:AC:RANGe:AUTO?: Query the enable state of ACV autorange function. The max range of ACV measurement is 750 V.

Return Format:

The query returns the enable state of ACV autorange function.

21. [SENSe:]VOLTage:AC:RANGe[:UPPer]

Command Format:

[SENSe:]VOLTage:AC:RANGe[:UPPer]□{<range>|MIN|MAX|DEF}
[SENSe:]VOLTage:AC:RANGe[:UPPer]?□[{MIN|MAX}]

Function:

The command sets or queries the range of ACV measurement.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{ 200 mV | 2 V | 20 V | 200 V | 750 V }	20 V

Explanations:

[SENSe:]VOLTage:AC:RANGe[:UPPer] □ {<range>|MIN|MAX|DEF}: Set the range of ACV measurement. <range> may be 200 mV, 2 V, 20 V, 200 V or 750 V, MIN = 200 mV, MAX = 750 V. Unit is V, so "200 mV" should be input in form of 0.2.
[SENSe:]VOLTage:AC:RANGe[:UPPer]?□[{MIN|MAX}]: Query the range of ACV measurement. The max range of ACV measurement is 750 V.

Return Format:

The query returns curent range of ACV measurement.

22. [SENSe:]VOLTage[:DC]:APERture

Command Format:

[SENSe:]VOLTage[:DC]:APERture□{<seconds>|MIN|MAX|DEF}
[SENSe:]VOLTage[:DC]:APERture?□[{MIN|MAX}]

Function:

The command sets or queries the interval time of DCV measurement.

Parameters:

Name	Type	Range of Values	Default
<seconds>	Consecutive Real Number	400 ms~2 s	400 ms

Explanations:

[SENSe:]VOLTage[:DC]:APERture□{<seconds>|MIN|MAX|DEF}: Set the interval time of DCV measurement. Unit is s, so "400 ms" should be input in the form of 0.4.

[SENSe:]VOLTage[:DC]:APERture?□[{MIN|MAX}]: Query the interval time of DCV measurement.

Return Format:

The query returns current interval time of DCV measurement.

23. [SENSe:]VOLTage[:DC]:APERture:ENABled

Command Format:

[SENSe:]VOLTage[:DC]:APERture:ENABled□{ON|OFF}

[SENSe:]VOLTage[:DC]:APERture:ENABled?

Function:

The command sets or queries the enable state of DCV interval time measuring function.

Explanations:

[SENSe:]VOLTage[:DC]:APERture:ENABled□{ON|OFF}: Enable oe disable DCV interval time measuring function.

[SENSe:]VOLTage[:DC]:APERture:ENABled?: Query the enable state of DCV interval time measuring function.

The command "CONFigure:VOLTage:DC", "MEASure:VOLTage:DC?", "[SENSe:] VOLTage[:DC]:NPLC" and "[SENSe:]VOLTage[:DC]:RESolution" can be used to disable interval time measuring function (OFF).

Return Format:

The query returns the enable state of DCV interval time measuring function.

24. [SENSe:]VOLTage[:DC]:IMPedance:AUTO

Command Format:

[SENSe:]VOLTage[:DC]:IMPedance:AUTO□{ON|OFF}

[SENSe:]VOLTage[:DC]:IMPedance:AUTO?

Function:

The command sets or queries the enable state of DCV input impedance measuring function.

Explanations:

[SENSe:]VOLTage[:DC]:IMPedance:AUTO□{ON|OFF}: Enable or disable DCV input impedance measuring function. The default is OFF. For all ranges, the impedance of DCV is 10 MΩ.

[SENSe:]VOLTage[:DC]:IMPedance:AUTO?: Query the enable state of DCV input impedance measuring function.

The command is available only for DCV. If DCV input impedance measuring function is ON, for the range of 100 mV, 1 V and 10 V, input impedance will be HI-Z (> 10 GΩ); for the range of 100 V and 1000 V, 10 MΩ.

The commands "CONFigure:VOLTage:DC" and "MEASure:VOLTage:DC?" can be used to disable input impedance measuring function (OFF).

Return Format:

The query returns the enable state of DCV input impedance measuring function.

25. [SENSe:]VOLTage[:DC]:NPLC

Command Format:

[SENSe:]VOLTage[:DC]:NPLC□{<PLCs>|MIN|MAX|DEF}

[SENSe:]VOLTage[:DC]:NPLC?□[{MIN|MAX}]

Function:

The command sets or queries the interval time of DCV measurement which is

multiples of PLC.

Parameters:

Name	Type	Range of Values	Default
<PLCs>	Discrete	{0.006|0.02|0.06|0.2|1|2|10|100}	1 PLC

Explanations:

[SENSe:]VOLTage[:DC]:NPLC□{<PLCs>|MIN|MAX|DEF}: Set the interval time of DCV measurement, input value is multiples of PLC. <PLCs> may be 0.006, 0.02, 0.06, 0.2, 1, 2, 10 or 100, MIN = 0.006 PLC, MAX = 100 PLC.

[SENSe:]VOLTage[:DC]:NPLC?□[{MIN|MAX}]: Query the interval time of DCV measurement, return value is multiples of PLC.

Return Format:

The query returns the interval time of DCV measurement which is multiples of PLC.

26. [SENSe:]VOLTage[:DC]:NULL[:STATe]

Command Format:

[SENSe:]VOLTage[:DC]:NULL[:STATe]□{ON|OFF}

[SENSe:]VOLTage[:DC]:NULL[:STATe]?

Function:

The command sets or queries the enable state of DCV NULL function.

Explanations:

[SENSe:]VOLTage[:DC]:NULL[:STATe]□{ON|OFF}: Enable or disable DCV NULL function.

[SENSe:]VOLTage[:DC]:NULL[:STATe]?: Query the enable state of DCV NULL function.

The command "[SENSe:]VOLTage[:DC]:NULL:VALue" can be used to set NULL value.

The commands "CONFigure:VOLTage:DC" and "MEASure:VOLTage:DC?" can be used to disable NULL function (OFF).

Return Format:

The query returns the enable state of DCV NULL function.

27. [SENSe:]VOLTage[:DC]:NULL:VALue

Command Format:

[SENSe:]VOLTage[:DC]:NULL:VALue□{<value>|MIN|MAX}
[SENSe:]VOLTage[:DC]:NULL:VALue?□[{MIN|MAX}]

Function:

The command sets or queries the NULL value of DCV measurement.

Parameters:

Name	Type	Range of Values	Default
<value>	Discrete	±120% max range	0

Explanations:

[SENSe:]VOLTage[:DC]:NULL:VALue□{<value>|MIN|MAX}: Set the NULL value of DCV measurement. MIN is -120% max range of current function, MAX is 120% max range of current function, DEF = 0.
[SENSe:]VOLTage[:DC]:NULL:VALue?□[{MIN|MAX}]: Query the NULL value of DCV measurement.
Before sending the command, do run the command "[SENSe:]VOLTage[:DC]: NULL[:STATe]□ON" to enable NULL function.

Return Format:

The query returns the NULL value of DCV measurement.

28. [SENSe:]VOLTage[:DC]:PEAK:STATe

Command Format:

[SENSe:]VOLTage[:DC]:PEAK:STATe□{ON|OFF}
[SENSe:]VOLTage[:DC]:PEAK:STATe?

Function:

The command sets or queries the enable state of DCV peak-to-peak measuring function.

Explanations:

[SENSe:]VOLTage[:DC]:PEAK:STATe □ {ON|OFF}: Enable or disable DCV peak-to-peak measuring function.

[SENSe:]VOLTage[:DC]:PEAK:STATe?: Query the enable state of DCV peak-to-peak measuring function.

The command "[SENSe:]VOLTage[:DC]:NULL:VALue" can be uesd to set DCV peak-to-peak value.

Return Format:

The query returns the enable state of DCV peak-to-peak measuring function.

29. [SENSe:]VOLTage[:DC]:RANGe:AUTO

Command Format:

[SENSe:]VOLTage[:DC]:RANGe:AUTO□{ON|OFF}

[SENSe:]VOLTage[:DC]:RANGe:AUTO?

Function:

The command sets or queries the enable state of DCV autorange measuring function.

Explanations:

[SENSe:]VOLTage[:DC]:RANGe:AUTO □ {ON|OFF}: Enable or disable DCV autorange measuring function. If DCV peak-to-peak measuring function is ON, the measuring range will be selected according to input signal.

[SENSe:]VOLTage[:DC]:RANGe:AUTO?: Query the enable state of DCV autorange measuring function.

Return Format:

The query returns the enable state of DCV autorange measuring function.

30. [SENSe:]VOLTage[:DC]:RANGe[:UPPer]

Command Format:

[SENSe:]VOLTage[:DC]:RANGe[:UPPer]□{<range>|MIN|MAX|DEF}

[SENSe:]VOLTage[:DC]:RANGe[:UPPer]?□[{MIN|MAX}]

Function:

The command sets or queries the range of DCV measurement.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{200 mV | 2 V | 20 V | 200 V | 1000 V}	20 V

Explanations:

[SENSe:]VOLTage[:DC]:RANGe[:UPPer] □ {<range>|MIN|MAX|DEF}: Set the range of DCV measurement. <range> may be 200 mV, 2 V, 20 V, 200 V, 1000 V, MIN = 200 mV, MAX = 1000 V. Unit is V, so "200 mV" should be input in form of 0.2.

[SENSe:]VOLTage[:DC]:RANGe[:UPPer]? □ [{MIN|MAX}]: Query the range of DCV measurement.

Return Format:

The query returns the range of DCV measurement.

31. [SENSe:]VOLTage[:DC]:RESolution

Command Format:

[SENSe:]VOLTage[:DC]:RESolution□{<resolution>|MIN|MAX|DEF}

[SENSe:]VOLTage[:DC]:RESolution?□[{MIN|MAX}]

Function:

The command sets or queries the resolution of DCV measurement.

Parameters:

Name	Type	Range of Values	Default
<resolution>	Discrete	{MIN|MAX|DEF}	Rate:medium

Explanations:

[SENSe:]VOLTage[:DC]:RESolution □ {<resolution>|MIN|MAX|DEF}: Set the resolution of DCV measurement. In default setting of <resolution>, the rate is medium.

[SENSe:]VOLTage[:DC]:RESolution?□[{MIN|MAX}]: Query the resolution of DCV

measurement.

Return Format:

The query returns the resolution of DCV measurement.

32. [SENSe:]VOLTage[:DC]:ZERO:AUTO

Command Format:

[SENSe:]VOLTage[:DC]:ZERO:AUTO□{ON|OFF}

[SENSe:]VOLTage[:DC]:ZERO:AUTO?

Function:

The command sets or queries the enable state of DCV auto zero measuring function.

Explanations:

[SENSe:]VOLTage[:DC]:ZERO:AUTO□{ON|OFF}: Enable or disable DCV auto zero measuring function.

[SENSe:]VOLTage[:DC]:ZERO:AUTO?: Query the enable state of DCV auto zero measuring function.

Return Format:

The query returns the enable state of DCV auto zero measuring function.

33. [SENSe:]RESistance:APERture

Command Format:

[SENSe:]RESistance:APERture□{<seconds>|MIN|MAX|DEF}

[SENSe:]RESistance:APERture?□[{MIN|MAX}]

Function:

The command sets or queries the interval time of 2-wire resistance measurement.

Parameters:

Name	Type	Range of Values	Default
<seconds>	Consecutive Real Number	400 ms~2 s	400 ms

Explanations:

[SENSe:]RESistance:APERture □ {<seconds>|MIN|MAX|DEF}: Set the interval time of 2-wire resistance measurement. Unit is s, so "400 ms" should be input in form of 0.4.

[SENSe:]RESistance:APERture?□[{MIN|MAX}]: Query the interval time of 2-wire resistance measurement.

2-wire and 4-wire resistance function both are influenced by the command. All the command of 2WR and 4WR will have influence over the setting of resistance.

Return Format:

The query returns the interval time of 2-wire resistance measurement.

34. [SENSe:]RESistance:APERture:ENABled

Command Format:

[SENSe:]RESistance:APERture:ENABled□{ON|OFF}

[SENSe:]RESistance:APERture:ENABled?

Function:

The command sets or queries the enable state of 2WR interval time measuring function.

Explanations:

[SENSe:]RESistance:APERture:ENABled □ {ON|OFF}: Enable or disable 2WR interval time measuring function.

[SENSe:]RESistance:APERture:ENABled?: Query the enable state of 2WR interval time measuring function.

The commands "CONFigure:RESistance", "MEASure:RESistance?", "[SENSe:] RESistance:NPLC" and "[SENSe:]RESistance:RESolution" can be used to disable interval time measuring function (OFF).

2-wire and 4-wire resistance function both are influenced by the command. All the command of 2WR and 4WR will have influence over the setting of resistance.

Return Format:

The query returns the enable state of 2WR interval time measuring function.

35. [SENSe:]RESistance:NPLC

Command Format:

[SENSe:]RESistance:NPLC□{<PLCs>|MIN|MAX|DEF}

[SENSe:]RESistance:NPLC?□[{MIN|MAX}]

Function:

The command sets or queries the interval time of 2-wire resistance measurement, input value is multiples of PLC.

Parameters:

Name	Type	Range of Values	Default
<PLCs>	Discrete	{0.006|0.02|0.06|0.2|1|2|10|100}	1 PLC

Explanations:

[SENSe:]RESistance:NPLC□{<PLCs>|MIN|MAX|DEF}: Set the interval time of 2-wire resistance measurement, input value is multiples of PLC. <PLCs> may be 0.006, 0.02, 0.06, 0.2, 1, 2, 10 or 100, MIN = 0.006 PLC, MAX = 100 PLC.

[SENSe:]RESistance:NPLC?□[{MIN|MAX}]: Query the interval time of 2-wire resistance measurement, return value is multiples of PLC.

2-wire and 4-wire resistance function both are influenced by the command. All the command of 2WR and 4WR will have influence over the setting of resistance.

Return Format:

The query returns the interval time of 2-wire resistance measurement, return value is multiples of PLC.

36. [SENSe:]RESistance:NULL[:STATe]

Command Format:

[SENSe:]RESistance:NULL[:STATe]□{ON|OFF}

[SENSe:]RESistance:NULL[:STATe]?

Function:

The command sets or queries the enable state of 2WR NULL measuring function.

Explanations:

[SENSe:]RESistance:NULL[:STATe]□{ON|OFF}: Enable or disable 2WR NULL measuring function.

[SENSe:]RESistance:NULL[:STATe]?: Query the enable state of 2WR NULL measuring function.

The command "[SENSe:]RESistance:NULL:VALue" can be used to set NULL value.

The commands "CONFigure:RESistance" and "MEASure:RESistance?" can be used to disable NULL function (OFF).

2-wire and 4-wire resistance function both are influenced by the command. All the command of 2WR and 4WR will have influence over the setting of resistance.

Return Format:

The command returns the enable state of 2WR NULL measuring function.

37. [SENSe:]RESistance:NULL:VALue

Command Format:

[SENSe:]RESistance:NULL:VALue□{<value>|MIN|MAX}

[SENSe:]RESistance:NULL:VALue?□[{MIN|MAX}]

Function:

The command sets or queries the NULL value of 2WR measurement.

Parameters:

Name	Type	Range of Values	Default
<value>	Discrete	±120% max range	0

Explanations:

[SENSe:]RESistance:NULL:VALue□{<value>|MIN|MAX}: Set the NULL value of 2WR measurement. MIN is -120% max range of current function, MAX is 120% max range of current function, DEF = 0.

[SENSe:]RESistance:NULL:VALue?□[{MIN|MAX}]: Query the NULL value of 2WR measurement.

Before sending the command, do run the command "[SENSe:]RESistance:NULL [:STATe]□ON" to enable NULL function.

2-wire and 4-wire resistance function both are influenced by the command. All the command of 2WR and 4WR will have influence over the setting of resistance.

Return Format:
The query returns the NULL value of 2WR measurement.

38. [SENSe:]RESistance:OCOMpensated

Command Format:
[SENSe:]RESistance:OCOMpensated□{ON|OFF}
[SENSe:]RESistance:OCOMpensated?

Function:
The command sets or queries the enable state of 2WR offset compensated function.

Explanations:
[SENSe:]RESistance:OCOMpensated□{ON|OFF}: Enable or disable 2WR offset compensated function.
[SENSe:]RESistance:OCOMpensated?: Query the enable state of 2WR offset compensated function.
The command is available for the range: 100 Ω, 1 kΩ and 10 kΩ.
2-wire and 4-wire resistance function both are influenced by the command. All the command of 2WR and 4WR will have influence over the setting of resistance.

Return Format:
The query returns the enable state of 2WR offset compensated function.

39. [SENSe:]RESistance:RANGe:AUTO

Command Format:
[SENSe:]RESistance:RANGe:AUTO□{ON|OFF}
[SENSe:]RESistance:RANGe:AUTO?

Function:
The command sets or queries the enable state of 2WR autorange measuring function.

Explanations:

[SENSe:]RESistance:RANGe:AUTO □ {ON|OFF}: Enable or disable 2WR autorange measuring function. If 2WR autorange function is ON, the measuring range will be selected according to input signal.

[SENSe:]RESistance:RANGe:AUTO?: Query the enable state of 2WR autorange measuring function.

2-wire and 4-wire resistance function both are influenced by the command. All the command of 2WR and 4WR will have influence over the setting of resistance.

Return Format:

The command returns the enable state of 2WR autorange measuring function.

40. [SENSe:]RESistance:RANGe[:UPPer]

Command Format:

[SENSe:]RESistance:RANGe[:UPPer]□{<range>|MIN|MAX|DEF}

[SENSe:]RESistance:RANGe[:UPPer]?□[{MIN|MAX}]

Function:

The command sets or queries the range of 2WR measurement.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{200 Ω | 2 kΩ | 20 kΩ | 200 kΩ | 2 MΩ | 10 MΩ | 100 MΩ}	200 kΩ

Explanations:

[SENSe:]RESistance:RANGe[:UPPer]□{<range>|MIN|MAX|DEF}: Set the range of 2WR measurement. <range> may be 200 Ω, 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ, 10 MΩ or 100 MΩ, MIN = 200 Ω, MAX =100 MΩ. Unit is Ω, so 2 kΩ should be input in form of 2000.

[SENSe:]RESistance:RANGe[:UPPer]?□[{MIN|MAX}]: Query the range of 2WR measurement.

2-wire and 4-wire resistance function both are influenced by the command. All the command of 2WR and 4WR will have influence over the setting of resistance.

Return Format:

The query returns the range of 2WR measurement.

41. [SENSe:]RESistance:RESolution

Command Format:

[SENSe:]RESistance:RESolution□{<resolution>|MIN|MAX|DEF}
[SENSe:]RESistance:RESolution?□[{MIN|MAX}]

Function:

The command sets or queries the resolution of 2WR measurement.

Parameters:

Name	Type	Range of Value	Default
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:

[SENSe:]RESistance:RESolution □ {<resolution>|MIN|MAX|DEF}: Set the resolution of 2WR measurement. In default of <resolution>, the rate is medium.
[SENSe:]RESistance:RESolution?□[{MIN|MAX}]: Query the resolution of 2WR measurement.
2-wire and 4-wire resistance function both are influenced by the command. All the command of 2WR and 4WR will have influence over the setting of resistance.

Return Format:

The query returns the resolution of 2WR measurement.

42. [SENSe:]RESistance:ZERO:AUTO

Command Format:

[SENSe:]RESistance:ZERO:AUTO□{ON|OFF}
[SENSe:]RESistance:ZERO:AUTO?

Function:

The command sets or queries the enable state of 2WR autozero measuring function.

Explanations:

[SENSe:]RESistance:ZERO:AUTO□{ON|OFF}: Enable or disable 2WR autozero measuring function.
[SENSe:]RESistance:ZERO:AUTO?: Query the enable state of 2WR autozero measuring function.

Return Format:
The query returns the enable state of 2WR autozero measuring function.

43. [SENSe:]FRESistance:APERture

Command Format:
[SENSe:]FRESistance:APERture□{<seconds>|MIN|MAX|DEF}
[SENSe:]FRESistance:APERture?□[{MIN|MAX}]

Function:
The command sets or queries the interval time of 4WR measurement.

Parameters:

Name	Type	Range of Values	Default
<seconds>	Consecutive Real Number	400 ms~2 s	400 ms

Explanations:
[SENSe:]FRESistance:APERture□{<seconds>|MIN|MAX|DEF}: Set the interval time of 4WR measurement. Unit is s, so "400 ms" should be input in form of 0.4.
[SENSe:]FRESistance:APERture?□[{MIN|MAX}]: Query the interval time of 4WR measurement.
2-wire and 4-wire resistance function both are influenced by the command. All the command of 2WR and 4WR will have influence over the setting of resistance.

Return Format:
The query returns the interval time of 4WR measurement.

44. [SENSe:]FRESistance:APERture:ENABled

Command Format:

[SENSe:]FRESistance:APERture:ENABled□{ON|OFF}
[SENSe:]FRESistance:APERture:ENABled?

Function:
The command sets or queries the enable state of 4WR interval time measuring function.

Explanations:
[SENSe:]FRESistance:APERture:ENABled□{ON|OFF}: Enable or disable 4WR interval time measuring function.
[SENSe:]FRESistance:APERture:ENABled?: Query the enable state of 4WR interval time measuring function.
The commands "CONFigure:FRESistance", "MEASure:FRESistance?", "[SENSe:] FRESistance:NPLC" and "[SENSe:]FRESistance:RESolution" can be used to disable interval time measuring function (OFF).
2-wire and 4-wire resistance function both are influenced by the command. All the command of 2WR and 4WR will have influence over the setting of resistance.

Return Format:
The command returns the enable state of 4WR interval time measuring function.

45. [SENSe:]FRESistance:NPLC

Command Format:
[SENSe:]FRESistance:NPLC□{<PLCs>|MIN|MAX|DEF}
[SENSe:]FRESistance:NPLC?□[{MIN|MAX}]

Function:
The command sets or queries the interval time of 4WR measurement, input value and returned value are both multiples of PLC.

Parameters:

Name	Type	Range of Values	Default
<PLCs>	Discrete	{0.006|0.02|0.06|0.2|1|2|10|100}	1 PLC

Explanations:
[SENSe:]FRESistance:NPLC□{<PLCs>|MIN|MAX|DEF}: Set the interval time of

4WR measurement, input value is multiples of PLC.
<PLCs> may be 0.006, 0.02, 0.06, 0.2, 1, 2, 10 or 100, MIN = 0.006 PLC, MAX = 100 PLC.
[SENSe:]FRESistance:NPLC?□[{MIN|MAX}]: Query the interval time of 4WR measurement, returned value is multiples of PLC.
2-wire and 4-wire resistance function both are influenced by the command. All the command of 2WR and 4WR will have influence over the setting of resistance.

Return Format:
The query returns the interval time of 4WR measurement, return value is multiples of PLC.

46. [SENSe:]FRESistance:NULL[:STATe]

Command Format:
[SENSe:]FRESistance:NULL[:STATe]□{ON|OFF}
[SENSe:]FRESistance:NULL[:STATe]?

Function:
The command sets or queries the enable state of 4WR NULL measuring function.

Explanations:
[SENSe:]FRESistance:NULL[:STATe]□{ON|OFF}: Enable or disable 4WR NULL measuring function.
[SENSe:]FRESistance:NULL[:STATe]?: Query the enable state of 4WR NULL measuring function.
The command "[SENSe:]FRESistance:NULL:VALue" can be used to set NULL value.
The commands "CONFigure:RESistance" and "MEASure:RESistance?" can be used to disable NULL function (OFF).
2-wire and 4-wire resistance function both are influenced by the command. All the command of 2WR and 4WR will have influence over the setting of resistance.

Return Format:
The query returns the enable state of 4WR NULL measuring function.

47. [SENSe:]FRESistance:NULL:VALue

Command Format:

[SENSe:]FRESistance:NULL:VALue□{<value>|MIN|MAX}

[SENSe:]FRESistance:NULL:VALue?□[{MIN|MAX}]

Function:

The command sets or queries the NULL value of 4WR measurement.

Parameters:

Name	Type	Range of Values	Default
<value>	Discrete	±120% max range	0

Explanations:

[SENSe:]FRESistance:NULL:VALue□{<value>|MIN|MAX}: Set the NULL value of 4WR measurement. MIN is -120% max range of current function, MAX is 120% max range of current function, DEF = 0.

[SENSe:]FRESistance:NULL:VALue?□[{MIN|MAX}]: Query the NULL value of 4WR measurement.

Before sending the command, do run "[SENSe:]FRESistance:NULL[:STATe]□ON" to enable NULL function.

2-wire and 4-wire resistance function both are influenced by the command. All the command of 2WR and 4WR will have influence over the setting of resistance.

Return Format:

The query returns the NULL value of 4WR measurement.

48. [SENSe:]FRESistance:OCOMpensated

Command Format:

[SENSe:]FRESistance:OCOMpensated□{ON|OFF}

[SENSe:]FRESistance:OCOMpensated?

Function:

The command sets or queries the enable state of 4WR offset compensated function.

Explanations:

[SENSe:]FRESistance:OCOMpensated□{ON|OFF}: Enable or disable 4WR offset compensated function.
[SENSe:]FRESistance:OCOMpensated?: Query the enable state of 4WR offset compensated function.
The command is available only for the range: 100 Ω, 1 kΩ and 10 kΩ.
2-wire and 4-wire resistance function both are influenced by the command. All the command of 2WR and 4WR will have influence over the setting of resistance.

Return Format:
The query returns the enable state of 4WR offset compensated function.

49. [SENSe:]FRESistance:RANGe:AUTO

Command Format:
[SENSe:]FRESistance:RANGe:AUTO□{ON|OFF}
[SENSe:]FRESistance:RANGe:AUTO?

Function:
The command sets or queries the enable state of 4WR autorange measuring function.

Explanations:
[SENSe:]FRESistance:RANGe:AUTO □ {ON|OFF}: Enable or disable 4WR autorange measuring function. If 4WR autorange measuring function is ON, the measuring range will be selected according to input siganl.
[SENSe:]FRESistance:RANGe:AUTO?: Query the enable state of 4WR autorange measuring function.
2-wire and 4-wire resistance function both are influenced by the command. All the command of 2WR and 4WR will have influence over the setting of resistance.

Return Format:
The query returns the enable state of 4WR autorange measuring function.

50. [SENSe:]FRESistance:RANGe[:UPPer]

Command Format:

[SENSe:]FRESistance:RANGe[:UPPer]□{<range>|MIN|MAX|DEF}
[SENSe:]FRESistance:RANGe[:UPPer]? [{MIN|MAX}]

Function:
The command sets or queries the range of 4WR measurement.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{200 Ω | 2 kΩ | 20 kΩ | 200 kΩ | 2 MΩ | 10 MΩ | 100 MΩ}	200 kΩ

Explanations:
[SENSe:]FRESistance:RANGe[:UPPer] □ {<range>|MIN|MAX|DEF}: Set the range of 4WR measurement. <range> may be 200 Ω, 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ, 10 MΩ or 100 MΩ, MIN = 200 Ω, MAX = 100 MΩ. Unit is Ω, so "2 kΩ" should be input in form of 2000.
[SENSe:]FRESistance:RANGe[:UPPer]?□[{MIN|MAX}]: Query the range of 4WR measurement.
2-wire and 4-wire resistance function both are influenced by the command. All the command of 2WR and 4WR will have influence over the setting of resistance.

Return Format:
The query returns the range of 4WR measurement.

51. [SENSe:]FRESistance:RESolution

Command Format:
[SENSe:]FRESistance:RESolution□{<resolution>|MIN|MAX|DEF}
[SENSe:]FRESistance:RESolution?□[{MIN|MAX}]

Function:
The command sets or queries the resolution of 4WR measurement.

Parameters:

Name	Type	Range of Values	Default
<resolution>	Discrete	{MIN|MAX|DEF}	Rate: medium

Explanations:

[SENSe:]FRESistance:RESolution □ {<resolution>|MIN|MAX|DEF}: Set the resolution of 4WR measurement. In default of <resolution>, the rate is medium.
[SENSe:]FRESistance:RESolution?□[{MIN|MAX}: Query the resolution of 4WR measurement.
2-wire and 4-wire resistance function both are influenced by the command. All the command of 2WR and 4WR will have influence over the setting of resistance.

Return Format:

The query returns the resolution of 4WR measurement.

52. [SENSe:]FREQuency:APERture

Command Format:

[SENSe:]FREQuency:APERture□{<seconds>|MIN|MAX|DEF}
[SENSe:]FREQuency:APERture?□[{MIN|MAX}]

Function:

The command sets or queries the interval time of frequency measurement.

Parameters:

Name	Type	Range of Values	Default
<seconds>	Consecutive Real Number	400 ms~2 s	400 ms

Explanations:

[SENSe:]FREQuency:APERture□{<seconds>|MIN|MAX|DEF}: Set the interval time of frequency measurement. Unit is s, so "400 ms" should be input in form of 0.4.
[SENSe:]FREQuency:APERture? □ [{MIN|MAX}]: Query the interval time of frequency measurement.

Return Format:

The query returns the interval time of frequency measurement.

53. [SENSe:]FREQuency:NULL[:STATe]

Command Format:

[SENSe:]FREQuency:NULL[:STATe]□{ON|OFF}

[SENSe:]FREQuency:NULL[:STATe]?

Function:

The command sets or queries the enable state of frequency NULL measuring function.

Explanations:

[SENSe:]FREQuency:NULL[:STATe] □ {ON|OFF}: Enable or disable frequency NULL measuring function.

[SENSe:]FREQuency:NULL[:STATe]?: Query the enable state of frequency NULL measuring function.

The command "[SENSe:]FREQuency:NULL:VALue" can be used to set NULL value.

The commands "CONFigure:FREQuency" and "MEASure:FREQuency?" can be used to disable NULL function (OFF).

Return Format:

The query returns the enable state of frequency NULL measuring function.

54. [SENSe:]FREQuency:NULL:VALue

Command Format:

[SENSe:]FREQuency:NULL:VALue□{<value>|MIN|MAX}

[SENSe:]FREQuency:NULL:VALue?□[{MIN|MAX}]

Function:

The command sets or queries the NULL value of frequency measurement.

Parameters:

Name	Type	Range of Values	Default
<value>	Discrete	±120% max range	0

Explanations:

[SENSe:]FREQuency:NULL:VALue□{<value>|MIN|MAX}: Set the NULL value of frequency measurement. MIN is -120% max range of current function, MAX is

120%max range of current function, DEF = 0.
[SENSe:]FREQuency:NULL:VALue?□[{MIN|MAX}]: Query the NULL value of frequency measurement.
Before sending the command, do run the command "[SENSe:]FREQuency:NULL [:STATe]□ON" to enable NULL function.

Return Format:
The query returns the NULL value of frequency measurement.

55. [SENSe:]FREQuency:VOLTage:RANGe:AUTO

Command Format:
[SENSe:]FREQuency:VOLTage:RANGe:AUTO□{ON|OFF}
[SENSe:]FREQuency:VOLTage:RANGe:AUTO?

Function:
The command sets or queries the enable state of voltage autorange measuring function in frequency measurement.

Explanations:
[SENSe:]FREQuency:VOLTage:RANGe:AUTO □ {ON|OFF}: Enble or disable voltage autorange measuring function in frequency measurement.
[SENSe:]FREQuency:VOLTage:RANGe:AUTO?: Query the enable state of voltage autorange measuring function in frequency measurement.
The max range of AC voltage is 750 V (rms), voltage RMS is determined by waveform.

Return Format:
The query returns the enable state of voltage autorange measuring function in frequency measurement.

56. [SENSe:]FREQuency:VOLTage:RANGe[:UPPer]

Command Format:
[SENSe:]FREQuency:VOLTage:RANGe[:UPPer]□{<range>|MIN|MAX|DEF}
[SENSe:]FREQuency:VOLTage:RANGe[:UPPer]?□[{MIN|MAX}]

Function:

The command sets or queries the voltage range in frequency measurement.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{200 mV | 2 V | 20 V | 200 V | 750 V}	20 V

Explanations:

[SENSe:]FREQuency:VOLTage:RANGe[:UPPer]□{<range>|MIN|MAX|DEF}: Set the voltage range in frequency measurement. <range> may be 200 mV, 2 V, 20 V, 200 V, 750 V, MIN = 200 mA, MAX = 750 V. Unit is V, so 200 mA should be input in form of 0.2.

[SENSe:]FREQuency:VOLTage:RANGe[:UPPer]? □ [{MIN|MAX}]: Query the voltage range in frequency measurement.

The max range of AC voltage is 750 V (rms), voltage RMS is determined by waveform.

Return Format:

The query returns the voltage range in frequency measurement.

57. [SENSe:]PERiod:APERture

Command Format:

[SENSe:]PERiod:APERture□{<seconds>|MIN|MAX|DEF}

[SENSe:]PERiod:APERture?□[{MIN|MAX}]

Function:

The command sets or queries the interval time of period measurement.

Parameters:

Name	Type	Range of Values	Default
<seconds>	Consecutive Real Number	400 ms~2 s	400 ms

Explanations:

[SENSe:]PERiod:APERture□{<seconds>|MIN|MAX|DEF}: Set the interval time

of period measurement. Unit is s, so "400 ms" should be input in form of 0.4.
[SENSe:]PERiod:APERture?□[{MIN|MAX}]: Query the interval time of period measurement.

Return Format:
The query returns the interval time of period measurement.

58. [SENSe:]PERiod:NULL[:STATe]

Command Format:
[SENSe:]PERiod:NULL[:STATe]□{ON|OFF}
[SENSe:]PERiod:NULL[:STATe]?

Function:
The command sets or queries the enable state of period NULL measuring function.

Explanations:
[SENSe:]PERiod:NULL[:STATe] □ {ON|OFF}: Enable or disable period NULL measuring function.
[SENSe:]PERiod:NULL[:STATe]?: Query the enable state of period NULL measuring function.
The command "[SENSe:]PERiod:NULL:VALue" can be used to set NULL value.
The commands "CONFigure:PERiod" and "MEASure:PERiod?" can be used to disable NULL function (OFF).

Return Format:
The command returns the enable state of period NULL measuring function.

59. [SENSe:]PERiod:NULL:VALue

Command Format:
[SENSe:]PERiod:NULL:VALue□{<value>|MIN|MAX}
[SENSe:]PERiod:NULL:VALue?□[{MIN|MAX}]

Function:

The command sets or queries the NULL value of period measurement.

Parameters:

Name	Type	Range of Values	Default
<value>	Discrete	±120% max range	0

Explanations:

[SENSe:]PERiod:NULL:VALue □ {<value>|MIN|MAX}: Set the NULL value of period measurement. MIN is -120% max range of current function, MAX is max range of current function, DEF = 0.

[SENSe:]PERiod:NULL:VALue?□[{MIN|MAX}]: Query the NULL value of period measurement.

Before sending the command, do run the command "[SENSe:]PERiod:NULL [:STATe]□ON" to enable NULL function.

Return Format:

The query returns the NULL value of period measurement.

60. [SENSe:]PERiod:VOLTage:RANGe:AUTO

Command Format:

[SENSe:]PERiod:VOLTage:RANGe:AUTO□{ON|OFF}

[SENSe:]PERiod:VOLTage:RANGe:AUTO?

Function:

The command sets or queries the enable state of voltage autorange measuring function in period measurement.

Explanations:

[SENSe:]PERiod:VOLTage:RANGe:AUTO□{ON|OFF}: Enable or disable voltage autorange measuring function in period measurement.

[SENSe:]PERiod:VOLTage:RANGe:AUTO?: Query the enable state of voltage autorange measuring function in period measurement.

The max range of AC voltage is 750 V (rms), voltage RMS is determined by waveform.

Return Format:

The query returns the enable state of voltage autorange measuring function in period measurement.

61. [SENSe:]PERiod:VOLTage:RANGe[:UPPer]

Command Format:

[SENSe:]PERiod:VOLTage:RANGe[:UPPer]□{<range>|MIN|MAX|DEF}
[SENSe:]PERiod:VOLTage:RANGe[:UPPer]?□[{MIN|MAX}]

Function:

The command sets or queries the voltage range of period measurement.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{200 mV | 2 V | 20 V | 200 V | 750 V}	20 V

Explanations:

[SENSe:]PERiod:VOLTage:RANGe[:UPPer]□{<range>|MIN|MAX|DEF}: Set the voltage range of period measurement. <range> may be 200 mV, 2 V, 20 V, 200 V or 750 V, MIN = 200 mV, MAX = 750 V. Unit is V, so 200 mV should be input in form of 0.2.

[SENSe:]PERiod:VOLTage:RANGe[:UPPer]?□[{MIN|MAX}]: Query the voltage range of period measurement.

The max range of AC voltage is 750 V (rms), voltage RMS is determined by waveform.

Return Format:

The query returns the voltage range of period measurement.

62. [SENSe:]CAPacitance:NULL[:STATe]

Command Format:

[SENSe:]CAPacitance:NULL[:STATe]□{ON|OFF}
[SENSe:]CAPacitance:NULL[:STATe]?

Function:

The command sets or queries the enable state of capacitance NULL measuring function.

Explanations:

[SENSe:]CAPacitance:NULL[:STATe]□{ON|OFF}: Enable or disable capacitance NULL measuring function.

[SENSe:]CAPacitance:NULL[:STATe]?: Query the enable state of capacitance NULL measuring function.

The command "[SENSe:]CAPacitance:NULL:VALue" can be used to set NULL value.

The commands "CONFigure:CAPacitance" and "MEASure:CAPacitance?" can be used to disable NULL function (OFF).

Return Format:

The query returns the enable state of capacitance measuring NULL function.

63. [SENSe:]CAPacitance:NULL:VALue

Command Format:

[SENSe:]CAPacitance:NULL:VALue□{<value>|MIN|MAX}

[SENSe:]CAPacitance:NULL:VALue?□[{MIN|MAX}]

Function:

The command sets or queries the NULL value of capacitance measurement.

Parameters:

Name	Type	Range of Values	Default
<value>	Discrete	±120% max range	0

Explanations:

[SENSe:]CAPacitance:NULL:VALue□{<value>|MIN|MAX}: Set the NULL value of capacitance measurement. MIN is -120% max range of current function, MAX is 120% max range of current function, DEF = 0.

[SENSe:]CAPacitance:NULL:VALue?□[{MIN|MAX}]: Query the NULL value of capacitance measurement.

Before sending the command, do run the command "[SENSe:]CAPacitance:NULL

[:STATe]□ON" to enable NULL function.

Return Format:

The query returns the NULL value of capacitance measurement.

64. [SENSe:]CAPacitance:RANGe:AUTO

Command Format:

[SENSe:]CAPacitance:RANGe:AUTO□{ON|OFF}

[SENSe:]CAPacitance:RANGe:AUTO?

Function:

The command sets or queries the enable state of capacitance autorange measuring function.

Explanations:

[SENSe:]CAPacitance:RANGe:AUTO□{ON|OFF}: Enable or disable capacitance autorange measuring function. If capacitance autorange function is ON, the measuring range will be selected according to input signal.

[SENSe:]CAPacitance:RANGe:AUTO?: Query the enable state of capacitance autorange measuring function.

The command "[SENSe:]CAPacitance:RANGe[:UPPer]" can be used to disable autorange function.

Return Format:

The query returns the enable state of capacitance autorange measuring function.

65. [SENSe:]CAPacitance:RANGe[:UPPer]

Command Format:

[SENSe:]CAPacitance:RANGe[:UPPer]□{<range>|MIN|MAX|DEF}

[SENSe:]CAPacitance:RANGe[:UPPer]?□[{MIN|MAX}]

Function:

The command sets or queries the range of capacitance measurement.

Parameters:

Name	Type	Range of Values	Default
<range>	Discrete	{2 nF | 20 nF | 200 nF | 2 μF | 200 μF| 10000 μF}	200 nF

Explanations:

[SENSe:]CAPacitance:RANGe[:UPPer] □ {<range>|MIN|MAX|DEF}: Set the range of capacitance measurement. <range> may be 2 nF, 20 nF, 200 nF, 2 μF, 200 μF or 10000 μF, MIN = 2 nF, MAX = 200 μF. Unit is F, so 200μF should be input in form of 0.0002.

[SENSe:]CAPacitance:RANGe[:UPPer]? □ [{MIN|MAX}]: Query the range of capacitance measurement.

Return Format:

The query returns the range of capacitance measurement.

System Commands

The commands are used to set communication ports and their parameters.

Which mainly include:

- SYStem:BEEPer:STATe
- SYSTem:COMMunicate:GPIB[:SELF]:ADDRess
- SYSTem:COMMunicate:LAN:BSTatus?
- SYSTem:COMMunicate:LAN:CONTrol?
- SYSTem:COMMunicate:LAN:DDNS
- SYSTem:COMMunicate:LAN:DHCP
- SYSTem:COMMunicate:LAN:DNS
- SYSTem:COMMunicate:LAN:DOMain
- SYSTem:COMMunicate:LAN:GATEway
- SYSTem:COMMunicate:LAN:HOSTname
- SYSTem:COMMunicate:LAN:IPADdress
- SYSTem:COMMunicate:LAN:MAC?
- SYSTem:COMMunicate:LAN:SMASk
- SYSTem:VERSion?

1. SYStem:BEEPer:STATe

Command Format:

SYStem:BEEPer:STATe□{ON|OFF}

SYStem:BEEPer:STATe?

Function:

The command sets or queries the switch state of beeper.

Explanations:

SYStem:BEEPer:STATe□{ON|OFF}: Turn beeper on or off.

SYStem:BEEPer:STATe?: Query the switch state of beeper.

Return Format:

The query returns the switch state of beeper.

2. SYSTem:COMMunicate:GPIB[:SELF]:ADDRess

Command Format:

SYSTem:COMMunicate:GPIB[:SELF]:ADDRess□{<address>}

SYSTem:COMMunicate:GPIB[:SELF]:ADDRess?

Function:

The command sets or queries the GPIB address.

Parameters:

Name	Type	Range of Values	Default
<address>	Discrete	0~30	7

Explanations:

SYSTem:COMMunicate:GPIB[:SELF]:ADDRess □ {<address>}: Set the GPIB address.

SYSTem:COMMunicate:GPIB[:SELF]:ADDRess?: Query the GPIB address.

Return Format:

The query returns the GPIB address.

3. SYSTem:COMMunicate:LAN:BSTatus?

Command Format:
SYSTem:COMMunicate:LAN:BSTatus?

Function:
The command queries the script state of LAN .

Explanations:
SYSTem:COMMunicate:LAN:BSTatus?: Query the script state of LAN. The possible return value: "LAN_DHCP" and "LAN_STATIC". "LAN_DHCP" denotes LAN script is DHCP address; "LAN_STATIC" denotes LAN script is static IP address.

Return Format:
The query returns the script state of LAN.

4. SYSTem:COMMunicate:LAN:CONTrol?

Command Format:
SYSTem:COMMunicate:LAN:CONTrol?

Function:
The command queries the number of Sockets control connection port.

Return Format:
The query returns the number of Sockets control connection port.

5. SYSTem:COMMunicate:LAN:DDNS

Command Format:
SYSTem:COMMunicate:LAN:DDNS□{ON|OFF}
SYSTem:COMMunicate:LAN:DDNS?

Function:
The command sets or queries the switch state of dynamic DNS (Domain Name Server).

Explanations:

SYSTem:COMMunicate:LAN:DDNS□{ON|OFF}: Turn dynamic DNS(DDNS) on or off.

SYSTem:COMMunicate:LAN:DDNS?: Query the switch state of dynamic DNS.

If the setting of DDNS is changed, the new configuration will be effective when power is on.

Return Format:

The query returns the switch state of DDNS.

6. SYSTem:COMMunicate:LAN:DHCP

Command Format:

SYSTem:COMMunicate:LAN:DHCP□{ON|OFF}

SYSTem:COMMunicate:LAN:DHCP?

Function:

The command sets or queries the enable state of DHCP (Dynamic Host Configuration Protocol).

Explanations:

SYSTem:COMMunicate:LAN:DHCP□{ON|OFF}: Enable or disable DHCP.

SYSTem:COMMunicate:LAN:DHCP?: Query the enable state of DHCP.

If DHCP is ON, the multimeter will try to obtain an IP address from DHCP. If a DHCP is found, it will assign a dynamic IP address, Subnet Mask, and Default Gateway to the instrument.

When DHCP is OFF, the multimeter will use the static IP address, Subnet Mask, and Default Gateway during power-on.

Return Format:

The query returns the enable state of DHCP.

7. SYSTem:COMMunicate:LAN:DNS

Command Format:

SYSTem:COMMunicate:LAN:DNS□"<address>"

SYSTem:COMMunicate:LAN:DNS?□[{CURRent|STATic}]

Function:

The command sets or queries the static DNS address.

Parameters:

Name	Type	Range of Values	Default
<address>	ASCII character string	"nnn.nnn.nnn.nnn" The range of "nnn" is 0~255.	"0.0.0.0"

Explanations:

SYSTem:COMMunicate:LAN:DNS□"<address>": Set the static DNS address.

SYSTem:COMMunicate:LAN:DNS?□[{CURRent|STATic}]: Query the static DNS address. "CURRent" denotes current DNS address, "STATic" denotes static DNS address.

If DHCP is ON, the multimeter will try to obtain an IP address from DHCP. If a DHCP is found, it will assign a dynamic IP address, Subnet Mask, and Default Gateway to the instrument.

When DHCP is OFF, the multimeter will use the static IP address, Subnet Mask, and Default Gateway during power-on.

Return Format:

The query returns the static DNS address.

8. SYSTem:COMMunicate:LAN:DOMain

Command Format:

SYSTem:COMMunicate:LAN:DOMain□"<name>"

SYSTem:COMMunicate:LAN:DOMain?□[{CURRent|STATic}]

Function:

The command sets or queries current domian name of instrument.

Parameter:

Name	Type	Range of Values	Default
<name>	ASCII character string	Self – defined, 20 characters at most	RIGOL

Explanations:

SYSTem:COMMunicate:LAN:DOMain□"<name>": Set the domian name.

SYSTem:COMMunicate:LAN:DOMain? □ [{CURRent|STATic}]: Query current domain name. "CURRent" denotes current domain name; "STATic" denotes the static domain name.

Return Format:

The command returns current domain name.

9. SYSTem:COMMunicate:LAN:GATEway

Command Format:

SYSTem:COMMunicate:LAN:GATEway□"<address>"

SYSTem:COMMunicate:LAN:GATEway?□[{CURRent|STATic}]

Function:

The command sets or queries the default gateway of instrument.

Parameters:

Name	Type	Range of Values	Default
<address>	ASCII Character string	"nnn.nnn.nnn.nnn" The range of "nnn" is 0~255	"172.16.3.1"

Explanations:

SYSTem:COMMunicate:LAN:GATEway□"<address>": Set the default gateway of instrument.

SYSTem:COMMunicate:LAN:GATEway? □ [{CURRent|STATic}]: Query the default gateway of instrument. "CURRent" denotes the current gateway; "STATic" denotes static gateway.

If DHCP is ON, the gateway set by manual is invalid.

If DHCP is OFF, the multimeter will use the static IP address, Subnet Mask, and Default Gateway during power-on.

Return Format:
The query returns current default gateway.

10. SYSTem:COMMunicate:LAN:HOSTname

Command Format:
SYSTem:COMMunicate:LAN:HOSTname□"<name>"
SYSTem:COMMunicate:LAN:HOSTname?□[{CURRent|STATic}]

Function:
The command sets or queries the host name of instrument.

Parameters:

Name	Type	Range of Values	Default
<name>	ASCII character string	Self – defined, 20 characters at most	SNIPE

Explanations:
SYSTem:COMMunicate:LAN:HOSTname□"<name>": Set the host name.
SYSTem:COMMunicate:LAN:HOSTname?□[{CURRent|STATic}]: Query the host name. "CURRent" denotes current host name; "STATic" denotes static host name.

Return Format:
The command returns current host name of instrument.

11. SYSTem:COMMunicate:LAN:IPADdress

Command Format:
SYSTem:COMMunicate:LAN:IPADdress□"<address>"
SYSTem:COMMunicate:LAN:IPADdress?□[{CURRent|STATic}]

Function:

The command sets or queries the IP address of instrument.

Parameters:

Name	Type	Range of Values	Default
<address>	ASCII character string	"nnn.nnn.nnn.nnn" The range of "nnn" is 0~255	"168.254.0.238"

Explanations:

SYSTem:COMMunicate:LAN:IPADdress□"<address>": Set the IP address.

SYSTem:COMMunicate:LAN:IPADdress?□[{CURRent|STATic}]: Query current IP address. "CURRent" denotes current IP address; "STATic" denotes static IP address.

If DHCP is ON, the IP address set by manual is invalid.

If DHCP is OFF, the multimeter will use the static IP address, Subnet Mask, and Default Gateway during power-on.

Return Format:

The query returns current IP address.

12. SYSTem:COMMunicate:LAN:MAC?

Command Format:

SYSTem:COMMunicate:LAN:MAC?

Function:

The command queries MAC (Media Access Control) address, that is link layer address.

Explanations:

SYSTem:COMMunicate:LAN:MAC?: Query the MAC address. The MAC address can be changed.

Return Format:

The query returns the MAC address in form of XX-XX-XX-XX-XX-XX. For example: 00-01-02-03-04-05.

13. SYSTem:COMMunicate:LAN:SMASk

Command Format:

SYSTem:COMMunicate:LAN:SMASk□"<mask>"

SYSTem:COMMunicate:LAN:SMASk?□[{CURRent|STATic}]

Function:

The command sets or queries the mask of instrument.

Parameters:

Name	Type	Range of Values	Default
<mask>	ASCII character string	"nnn.nnn.nnn.nnn" The range of "nnn" is 0~255	"255.255.255.0"

Explanations:

SYSTem:COMMunicate:LAN:SMASk□"<mask>": Set the mask of instrument.

SYSTem:COMMunicate:LAN:SMASk?□[{CURRent|STATic}]: Query the mask of instrument.

If DHCP is ON, the mask address set by manual is invalid.

If DHCP is OFF, the multimeter will use the static IP address, Subnet Mask, and Default Gateway during power-on.

Return Format:

The query returns current mask.

14. SYSTem:VERSion?

Command Format:

SYSTem:VERSion?

Function:

The commanf queries the SCPI version of instrument.

Return Format:

The query returns the SCPI version of instrument. For example, "2007.7".

Trigger Commands

The commands are used to set trigger parameters, such as trigger times, trigger delayed time and so on. It is suggested that the command "SENSe:<function>: RANGe:AUTO OFF" should be used to disable autorange function, the commands "SENSe:<function>:RANGe, CONFigure" or "MEASure?" be used to set range by manual.

Which mainly include:

- TRIGger:COUNt
- TRIGger:DELay
- TRIGger:DELay:AUTO
- TRIGger:SLOPe
- TRIGger:SOURce

1. TRIGger:COUNt

Command Format:

TRIGger:COUNt□{<count>|MIN|MAX|DEF|INFinity}
TRIGger:COUNt?□[{MIN|MAX}]

Function:

The command sets or queries the trigger times used in multimeter.

Parameters:

Name	Type	Range of Values	Default
<count>	Consecutive Integer	1~50000	Required parameter

Explanations:

TRIGger:COUNt□{<count>|MIN|MAX|DEF}: Set the trigger times.
TRIGger:COUNt?□[{MIN|MAX}]: Query the trigger times.
The command is only available for remote operation, not for front panel operation.
The command "CONFigure" or "MEASure?" can be used to set trigger times as 1.
It is suggested that the "SENSe:<function>:RANGe:AUTO□OFF" should be used to disable autorange function, the command "SENSe:<function>:RANGe" , "CONFigure" or "MEASure?" be used to set range by manual.

Return Format:

The query returns the trigger times used in multimeter.

2. TRIGger:DELay

Command Format:

TRIGger:DELay□{<seconds>|MIN|MAX|DEF}
TRIGger:DELay?□[{MIN|MAX}]

Function:

The command sets or queries the delay time between trigger signal and starting measurement.

Parameters:

Name	Type	Range of Values	Default
<seconds>	Consecutive Integer	0~3600	Required parameter

Explanations:

TRIGger:DELay□{<seconds>|MIN|MAX|DEF}: Set the delay time.

TRIGger:DELay?□[{MIN|MAX}]: Queries the delay time between trigger signal and starting measurement.

In continuity test and diode test, delay time is not set.

For AC measurement, the delay time is affected by bandwidth.

The command "CONFigure" or "MEASure?" can be used to set automatically delay time.

The command "TRIGger:DELay" can be used to set delay time as well as disable auto delay function (TRIGger:DELay:AUTO).

It is suggested that the command "SENSe:<function>:RANGe:AUTO□OFF" should be used to disable autorange function, the command "SENSe:<function>: RANGe", "CONFigure" or "MEASure?" be uesd to set range by manual.

Return Format:

The query returns the delay time between trigger signal and starting measurement.

3. TRIGger:DELay:AUTO

Command Format:

TRIGger:DELay:AUTO□{ON|OFF}

TRIGger:DELay:AUTO?

Function:

The command sets or queries the enable state of trigger autodelay function.

Explanations:

TRIGger:DELay:AUTO□{ON|OFF}: Enable or disable trigger autodelay function.

TRIGger:DELay:AUTO?: Query the enable state of trigger autodelay function.

The command "TRIGger:DELay" can be used to set delay time as well as disable auto delay function (TRIGger:DELay:AUTO).

The command "CONFigure" or "MEASure?" can be used to set delay time.
It is suggested that the command "SENSe:<function>:RANGe:AUTO□OFF" should be used to disable autorange function, the command "SENSe:<function>: RANGe", "CONFigure" or "MEASure?" be uesd to set range by manual.

Return Format:
The query returns the enable state of trigger autodelay function.

4. TRIGger:SLOPe

Command Format:
TRIGger:SLOPe□{POSitive|NEGative}
TRIGger:SLOPe?

Function:
The command sets or queries external trigger type, including rising edge (POSitive) and falling edge (NEGative).

Explanations:
TRIGger:SLOPe□{POSitive|NEGative}: Set the external trigger type as POSitive or NEGative.
TRIGger:SLOPe?: Query the external trigger type.
It is suggested that the command "SENSe:<function>:RANGe:AUTO□OFF" should be used to disable autorange function, the command "SENSe:<function>: RANGe", "CONFigure" or "MEASure?" be uesd to set range by manual.

Return Format:
The query returns the external trigger type.

5. TRIGger:SOURce

Command Format:
TRIGger:SOURce□{IMMediate|EXTernal|BUS}
TRIGger:SOURce?

Function:

The command sets or queries trigger source.

Explanations:

TRIGger:SOURce□{IMMediate|EXTernal|BUS}: Select the trigger source.

TRIGger:SOURce?: Query the trigger source.

The possible return value is IMMediate, EXTernal and BUS, IMMediate denotes trigger signal will be generated immediately; EXTernal denotes external trigger source on rear panel will be used; BUS (software trigger) denotes the command "*TRG" will be trigger source. Before sending the command "*TRG", the instrument must be the state of "wait trigger".

After the trigger source is selected, the instrument must be set as "wait trigger" mode, or the trigger source will be accepted.

The command "CONFigure" or "MEASure?" can be used to set trigger source as immediately mode (IMM).

It is suggested that the command "SENSe:<function>:RANGe:AUTO□OFF" should be used to disable autorange function, the command "SENSe:<function>:RANGe", "CONFigure" or "MEASure?" be uesd to set range by manual.

Return Format:

The query returns current trigger source.

Chapter 6 DM3058 Compatibility Mode

Besides **RIGOL** commands system, DM3058 is also compatible with some of remote control commands from Agilent and Fluke multimeter. If users have been familiar with Agilent and Fluke's commands, you can operate DM3058 conveniently.

This chapter lists the compatible and incompatible commands for your reference. For the detailed meaning and operation method of each command, please refer to related companies' commands introduction.

Compatible Agilent Commands

The following table lists the Agilent commands supported by **RIGOL** DM3058 digital multimeter. Before using the commands, you should send the **CMDSET** command (refer to Page **1-5**): CMDSET□AGILENT to select Agilent command system.

Compatible Agilent Commands				
CALCulate	:AVERage	:AVERage?		
		:CLEar		
		:COUNt?		
		:MAXimum?		
		:MINimum?		
		:PTPeak?		
		:SDEViation?		
	:DB	:REFerence		
		:REFerence?		
	:DBM	:REFerence		
		:REFerence?		
	:FUNCtion			
	:FUNCtion?			
	:LIMit	:LOWer		
		:LOWer?		
		:UPPer		
		:UPPer?		
	:NULL	:OFFSet		
		:OFFSet?		
	:STATE			
	:STATE?			
CONFigure	?			
	:CAPacitance			
	:CONTinuity			
	:CURRent	:AC		
		[:DC]		
	:DIODe			
	:FREQuency			

	:FRESistance			
	:PERiod			
	:RESistance			
	[:VOLTage]	:AC		
		[:DC]		
CAPacitance	:NULL	[:STATe]		
		[:STATe]?		
		:VALue		
		:VALue?		
	:RANGe	:AUTO		
		:AUTO?		
		[:UPPer]		
		[:UPPer]?		
CURRent	:AC	:BANDwidth		
		:BANDwidth?		
		:NULL	[:STATe]	
			[:STATe]?	
			:VALue	
			:VALue?	
		:PEAK	:STATe	
			:STATe?	
		:RANGe	:AUTO	
			:AUTO?	
			[:UPPer]	
			[:UPPer]?	
	[:DC]	:APERture		
		:APERture?		
		:NPLC		
		:NPLC?		
		:NULL		
			[:STATe]	
			[:STATe]?	
			:VALue	
			:VALue?	
		:PEAK		
			:STATe	
			:STATe?	
		:RANGe		

			:AUTO	
			:AUTO?	
			[:UPPer]	
			[:UPPer]?	
		:RESolution		
		:RESolution?		
DATA	:DATA?			
	:DELete			
	:LAST?			
	:REMove?			
FETCh	?			
	:CURRent	:AC	:PTPeak?	
		[:DC]	:PEAK	:MAXimum?
				:MINimum?
			:PTPeak?	
	:VOLTage	:AC	:PTPeak?	
		[:DC]	:PEAK	:MAXimum?
				:MINimum?
			:PTPeak?	
FREQuency	:APERture			
	:APERture?			
	:NULL	[:STATe]		
		[:STATe]?		
		:VALue		
		:VALue?		
	:RANGe	:LOWer		
		:LOWer?		
	:VOLTage	:RANGe	:AUTO	
			:AUTO?	
			[:UPPer]	
			[:UPPer]?	
FRESistance	:APERture			
	:APERture?			
	:NPLC			
	:NPLC?			
	:NULL	[:STATe]		
		[:STATe]?		

		:VALue		
		:VALue?		
	:RANGe	:AUTO		
		:AUTO?		
		[:UPPer]		
		[:UPPer]?		
	:RESolution			
	:RESolution?			
FUNCtion	[:ON]			
	[:ON]?			
*IDN?				
MEASure	:CAPacitance?			
	:CONTinuity?			
	:CURRent	:AC?		
		[:DC]?		
	:DIODe?			
	:FREQuency?			
	:FRESistance?			
	:PERiod?			
	:RESistance?			
	[:VOLTage]	:AC?		
		[:DC]?		
MEMory	:NSTates?			
	:STATe	:CATalog?		
		:DELete		
		:DELete	:ALL	
		:NAME		
		:NAME?		
		:RECall	:AUTO	
		:RECall	:AUTO?	
			:SELect	
			:SELect?	
		:VALid?		
OUTPut	:TRIGger	:SLOPe		
PERiod	:APERture			
	:APERture?			
	:NULL	[:STATe]		
		[:STATe]?		

		:VALue		
		:VALue?		
	:RANGe	:LOWer		
		:LOWer?		
	:VOLTage	:RANGe	:AUTO	
			:AUTO?	
			[:UPPer]	
			[:UPPer]?	
*RCL				
*RST				
RESistance	:APERture			
	:APERture?			
	:NPLC			
	:NPLC?			
	:NULL	[:STATe]		
		[:STATe]?		
		:VALue		
		:VALue?		
	:RANGe	:AUTO		
		:AUTO?		
		[:UPPer]		
		[:UPPer]?		
	:RESolution			
	:RESolution?			
*SAV				
SAMPle	:SOURce			
	:SOURce?			
	:TIMer			
	:TIMer?			
[SENSe:]	CAPacitance	:NULL	[:STATe]	
			[:STATe]?	
			:VALue	
			:VALue?	
		:RANGe	:AUTO	
			:AUTO?	
			[:UPPer]	
			[:UPPer]?	

	CURRent	:AC	:BANDwidth	
			:BANDwidth?	
			:NULL	[:STATe]
				[:STATe]?
				:VALue
				:VALuE?
			:PEAK	:STATe
				:STATe?
			:RANGe	:AUTO
				:AUTO?
				[:UPPer]
				[:UPPer]?
		[:DC]	:APERture	
			:APERture?	
			:APERture	:ENABled?
			:NPLC	
			:NPLC?	
			:NULL	[:STATe]
				[:STATe]?
				:VALue
				:VALuE?
			:PEAK	:STATe
				:STATe?
			:RANGe	:AUTO
				:AUTO?
				[:UPPer]
				[:UPPer]?
			:RESolution	
			:RESolution?	
			:ZERO	:AUTO
				:AUTO?
	FREQuency	:APERture		
		:APERture?		
		:NULL	[:STATe]	
			[:STATe]?	
			:VALue	
			:VALue?	
		:RANGe	:LOWer	

			:LOWer?	
		:VOLTage	:RANGe	:AUTO
				:AUTO?
				[:UPPer]
				[:UPPer]?
	FRESistance	:APERture		
		:APERture	:ENABled?	
		:NPLC		
		:NPLC?		
		:NULL	[:STATe]	
			[:STATe]?	
			:VALue	
			:VALue?	
		:OCOMpensated		
		:OCOMpensated?		
		:RANGe	:AUTO	
			:AUTO?	
			[:UPPer]	
			[:UPPer]?	
		:RESolution		
		:RESolution?		
	FUNCtion	[:ON]		
		[:ON]?		
	PERiod	:APERture		
		:APERture?		
		:NULL	[:STATe]	
			[:STATe]?	
			:VALue	
			:VALue?	
		:RANGe	:LOWer	
			:LOWer?	
		:VOLTage	:RANGe	:AUTO
				:AUTO?
				[:UPPer]
				[:UPPer]?
	RESistance	:APERture		
		:APERture?		

		:APERture	:ENABled?	
		:NPLC		
		:NPLC?		
		:NULL	[:STATe]	
			[:STATe]?	
			:VALue	
			:VALue?	
		:OCOMpensated		
		:OCOMpensated?		
		:RANGe	:AUTO	
			:AUTO?	
			[:UPPer]	
			[:UPPer]?	
		:RESolution		
		:RESolution?		
		:ZERO	:AUTO	
			:AUTO?	
	VOLTage	:AC	:BANDwidth	
			:BANDwidth?	
			:NULL	[:STATe]
				[:STATe]?
				:VALue
				:VALue?
			:PEAK	:STATe
				:STATe?
			:RANGe	:AUTO
				:AUTO?
				[:UPPer]
				[:UPPer]?
		[:DC]	:APERture	
			:APERture?	
			:APERture	:ENABled?
			:IMPedance	:AUTO
				:AUTO?
			:NPLC	
			:NPLC?	
			:NULL	[:STATe]
				[:STATe]?

				:VALue
				:VALue?
			:PEAK	:STATe
				:STATe?
			:RANGe	:AUTO
				:AUTO?
				[:UPPer]
				[:UPPer]?
			:RESolution	
			:RESolution?	
			:ZERO	:AUTO
				:AUTO?
SYStem	:BEEPer	:STATe		
		:STATe?		
	:COMMunicate	:GPIB	[:SELF]	:ADDRess
				:ADDRess?
		:LAN	:BSTatus?	
			:CONTrol?	
			:DDNS	
			:DDNS?	
			:DHCP	
			:DHCP?	
			:DNS	
			:DNS?	
			:DOMain	
			:DOMain?	
			:GATEway	
			:GATEway?	
			:HOSTname	
			:HOSTname?	
			:IPADdress	
			:IPADdress?	
			:MAC?	
			:SMASk	
			:SMASk?	
	:VERSion?			
*TRG				

TRIGger	:COUNt			
	:COUNt?			
	:DELay			
	:DELay?			
	:DELay	:AUTO		
		:AUTO?		
	:SLOPe			
	:SLOPe?			
	:SOURce			
	:SOURce?			
VOLTage	:AC	:BANDwidth		
		:BANDwidth?		
		:NULL	[:STATe]	
			[:STATe]?	
			:VALue	
			:VALue?	
		:PEAK	:STATe	
			:STATe?	
		:RANGe	:AUTO	
			:AUTO?	
			[:UPPer]	
			[:UPPer]?	
	[:DC]	:APERture		
		:APERture?		
		:IMPedance	:AUTO	
			:AUTO?	
		:NPLC		
		:NPLC?		
		:NULL	[:STATe]	
			[:STATe]?	
			:VALue	
			:VALue?	
		:PEAK	:STATe	
			:STATe?	
		:RANGe	:AUTO	
			:AUTO?	
			[:UPPer]	
			[:UPPer]?	

		:RESolution		
		:RESolution?		

Incompatible Agilent Commands

The following Agilent commands are not supported by **RIGOL** DM3058 digital multimeter.

Incompatible Agilent Commands				
ABORt				
INITiate	[:IMMediate]			
R?	[<max_count>]			
READ?				
ROUTe	:TERMinals?			
UNIT	:TEMPerature			
	:TEMPerature?			
CALibration	[:ALL]?			
	:ADC?			
	:COUNt?			
	:LFRequency?			
	:LFRequency			
		:ACTual?		
	:SECure	:CODE		
		:STATe		
		:STATe?		
	:STRing			
	:STRing?			
	:STORe			
	:VALue			
	:VALue?			
CONFigure	:TEMPerature			
DATA	:COPY :POINts	:EVENt	:THReshold :THReshold?	
	:POINts?			
DISPlay	[:WINDow	[1|2]	[:STATe]]	
			[:STATe]]?	
		[1|2]]	:TEXT	:CLEar
				[:DATA]

				[:DATA]?
	:WINDow2	:TEXT	:FEED	
			:FEED?	
FORMat	:BORDer			
	:BORDer?			
	[:DATA]			
	[:DATA]?			
*TRG				
*TST?				
*WAI				
MEASure	:TEMPerature?			
SAMPle	:COUNt	:PRETrigger		
		:PRETrigger?		
	:SOURce			
	:SOURce?			
SYSTem	:BEEPer	[:IMMediate]		
	:HELP?			
	:LANGuage			
	:LANGuage?			
	:LFRequency?			
	:LFRequency	:ACTual?		
	:LOCK	:NAME?		
		:OWNer?		
		:RELease		
		:REQuest?		
	:PRESet			
	:SECurity	:IMMediate		
	:COMMunicate	:ENABle		
		:ENABle?		
		:LAN	:AUTOip	[:STATe]
				[:STATe]?
			:HISTory?	
			:HISTory	:CLEar
			:KEEPalive	
			:KEEPalive?	
			:LIPaddress?	
			:MEDiasense	

			:MEDiasense?	
			:NETBios	
			:NETBios?	
			:TELNet	:PROMpt
				:PROMpt?
				:WMESsage
				:WMESsage?
TRIGger	:LEVel			
	:LEVel?			
	:SOURce	INTernal[1]		

NOTE: [1] Not supports the INTernal trigger mode.

Compatible Fluke Commands

The following table lists the Fluke commands supported by **RIGOL** DM3058 digital multimeter. Before using the commands, you should send the **CMDSET** command (refer to Page **1-5**): CMDSET□FLUKE to select Agilent command system.

Compatible Fluke Commands
AAC
AAC2
ADC
ADC2
AUTO
AUTO?
CLR2
COMP
COMP?
COMPCLR
COMPHI
COMPLO
CONT
DB
DBCLR
DBPOWER
DBREF?
DBREF
DIODE
FIXED
FREQ
FREQ2
FUNC1?
FUNC2?
HOLD
HOLDCLR
HOLDTHRESH?
HOLDTHRESH

MAX
MAXSET
MEAS?
MEAS1?
MEAS2?
MIN
MINSET
MMCLR
MNMX
MNMXSET
MOD?
OHMS
OHMS2
RANGE
RANGE1?
RANGE2?
RATE
RATE?
REL
RELCLR
RELSET?
RELSET
VAC
VAC2
VAL?
VAL1?
VAL2?
VDC
VDC2
WIRE2
WIRE4

Chapter 7 Application Examples

This chapter introduces how to use the commands to realize the measurements. Users can refer and deepen the understanding to the commands.

In order to explain easily, the serial number before each command is used to mark current command but not be the content of command. The contents between " / * " and " * / " after each command are explanations which can help users to understand.

Before operating, please connect the related test equipment and the tested device.

Example 1: Reading Statistic

Purpose: To achieve the maximum statistic.

In maximum statistic calculation, the first reading is regarded as the maximum. If continuing measuring, the multimeter is updating the readings. The multimeter will give a beep (the beeper must be on) when catching the maximum.

The programming steps——RIGOL Commands:

```
0   *RST                        /*Reset the instrument for preparing measurement*/
1   cmdset□rigol                /*Select RIGOL commands*/
2   *IDN?                       /*Query equipment ID to confirm if the instrument
    works normally*/
3   /*Return: RIGOL Technoligies, DM3058, DM3A020080808, 99.00.00.00.00.00*/
4   :function:voltage:DC        /*Enable DC voltage measuring function*/
5   :measure□AUTO               /*Select automatic measurement*/
6   :calculate:function□max     /*Enable maximum statistic calculation function*/
7   :calculate:statistic:max?   /*Query the measured maximum DC voltage*/
8   /*Return: 5.000064e-02*/
9   :calculate:statistic:count? /*Query the measured times*/
10  /*Return: 252*/
11  :calculate:function□none    /*Exit math operation function*/
```

Remarks:

1. Command line 7 returns current maximum DC voltage.
2. Command line 9 returns the measured times.
3. Command line 11 exits math operation function.

The programming steps——Agilent Commands:

0 cmdset□agilent /*Select Agilent commands*/
1 *CLS /*Clear the instrument state*/
2 *IDN? /*Query equipment ID to confirm if the instrument works normally*/
3 /*Return: RIGOL Technoligies, DM3058, DM3A020080808, 99.00.00.00.00.00*/
4 conf:volt:dc□auto /*Set DC voltage measuring function, auto mode*/
5 calc:stat□on /*Enable math operation function*/
6 calc:func□aver /*Set statistic fucntion*/
7 calc:aver:max? /*Query the maximum measured DC voltage*/
8 /*Return: 5.000104e-02*/
9 calc:aver:coun? /*Query the measured times*/
10 /*Return: 63*/
11 calc:stat□OFF /*Exit math operation function*/

Remarks:

1. After execute the fourth command, the default measuring rate will change to "Fast". The measuring rate and the resolution are relevant. The rate can be changed by setting different resolutions. For example, sending "conf:volt:dc auto,max" will set the measuring rate to "slow".
2. Command line 7 returns the maximum measured DC voltage.
3. Command line 9 returns the measured times.

Example 2: Elimination of Test Impedance Error

Purpose: To eliminate impedance error of test down-lead.
In measuring the smaller resistance, the impedance of test down-lead leads to error. So uses should eliminate the impedance error of test down-lead before measuring.

The programming steps——RIGOL Commands:

0 *RST /*Reset the instrument for preparing measurement*/
1 cmdset□rigol /*Select **RIGOL** commands*/
2 *IDN? /*Query equipment ID to confirm if the instrument works normally*/
3 /*Return: RIGOL Technoligies, DM3058, DM3A020080808, 99.00.00.00.00.00*/
4 :function:resistance /*Enable resistance measuring function*/
5 :measure:resistance□MIN /*Set the measuring range of 2-wire resistance to 200 Ω*/
6 /*Short-circuit the red and black test lead which are used for resistance measurement*/
7 :calculate:function□AVERAGE /*Enable average calculation function*/
8 :calculate:statistic:average? /*Query the average resistance*/
9 /*Note the returned value: 3.302198e-01 */
10 :calculate:function□REL /*Set relative operation function*/
11 :calculate:REL:state□ON /*Enable relative operation function*/
12 :calculate:REL:offset? /*Query current relative offset which is used to check the instrument*/
13 /*zero should be returned*/
14 :calculate:REL:offset□0.330219 /*Set the measured offset as the relative offset*/
15 :calculate:REL:state□ON /*Use the new offset to perform the relative operation*/
16 :calculate:function□AVERAGE /*Enable average calculation function*/
17 :calculate:statistic:average? /*Query the average resistance*/
18 /*The new measured value: 3.173456e-04*/

Remarks:

1. Execute the operations described in line 6 before sending command line 7.
2. The result shown in line 18 indicates that after the relative operation, the measured resistance value reduced 3 magnitudes (from -01 to -04).

The programming steps——Agilent Commands:

0 cmdset□agilent /*Select Agilent commands*/
1 *CLS /*Clear the instrument state*/
2 *IDN? /*Query equipment ID to confirm if the instrument works normally*/
3 /*Return: RIGOL Technoligies, DM3058, DM3A020080808, 99.00.00.00.00.00*/
4 conf:res□min /*Set resistance measure function*/
5 /*Short-circuit the red and black test lead which are used for resistance measurement*/
6 calc:stat□on /*Enable math operation function*/
7 calc:func□aver /*Enable average calculation function*/
8 calc:aver:aver? /*Query the average resistance*/
9 /*Return: 3.079573e-03*/
10 calc:func□null /*Enable NULL operation function*/
11 calc:null:offs? /*Query the current NULL offset*/
12 /*Return: 0.000000e+00 */
13 calc:null:offs 0.000379573 /*Set the measured offset as the NULL offset*/
14 calc:func□null /*Use the new offset to perform NULL operation*/
15 calc:func□aver /*Enable average calculation function*/
16 calc:aver:aver? /*Query the average resistance*/
17 /*The new measured value: 3.313395e-07 */

Remarks:

1. Execute the operations described in line 5 before sending command line 6.
2. The result shown in line 16 indicates that after the relative operation, the measured resistance value reduced 4 magnitudes (from -03 to -07).

Example 3: dBm Measurement

Purpose: Use commands to perform dBm measurement.
dBm measurement is frequently used in signal measurement and analysis.

The programming steps——RIGOL Commands:

0 *RST /*Reset the instrument for preparing measurement*/
1 cmdset□rigol /*Select **RIGOL** commands*/
2 *IDN? /*Query equipment ID to confirm if the instrument works normally*/
3 /*Return: RIGOL Technoligies, DM3058, DM3A020080808, 99.00.00.00.00.00*/
4 :function:resistance /*Enable resistance measuring function*/
5 :measure□AUTO /*Set the measuring range to "AUTO"*/
6 :measure:resistance? /*Query the measured resistance*/
7 /*The return value is used as the reference resistance for dBm measurement*/
8 :function:voltage:AC /*Enable AC voltage measuring function*/
9 :measure□AUTO /*Set the measuring range to "AUTO"*/
10 :calculate:function□DBM /*Enable dBm measuring function*/
11 :calculate:DBM:reference□<value> /*Set the reference voltage*/
12 :calculate:DBM? /*Query the measured result*/
13 /*Return value*/

Remarks:

1. Before sending line 6 command , the instrument should be connected under resistance measure mode.
2. Parameter in command line 11 is the returned value in line 7.

The programming steps——Agilent Commands:

```
0  *cls                          /*Clear the instrument state*/
1  cmdset□agilent                /*Select Agilent commands*/
2  *IDN?                         /*Query equipment ID to confirm if the
   instrument works normally*/
3  meas:res?□auto                /*Enable resistance measuring function, auto
   range; return the measured value*/
4  /*The returned value is used as the reference resistance for dBm measurement*/
5  conf:volt:ac□auto             /*Enable AC voltage measuring function and use
   auto range*/
6  calc:stat□on                  /*Enable math operation function*/
7  calc:func□dbm                 /*Set dBm measuring function*/
8  calc:dbm:ref□<value>          /*Set the reference voltage*/
9  calc:dbm:ref?                 /*Query the measured result*/
10 /*get return value*/
```

Remarks:

1. Before sending line 3 command , the instrument should be connected under resistance measure mode.
2. Parameter in command line 9 is the return value in line 3.

Example 4: dB Measurement

Purpose: Use commands to perform dB measurement.
dB measurement unit which is frequently used in electrician, wireless, mechanics, oscillatory surge, mechanical power, acoustics and some other fields.

The programming steps——RIGOL Commands:

0 *RST /*Reset the instrument for preparing measurement*/
1 cmdset□rigol /*Select **RIGOL** commands*/
2 *IDN? /*Query equipment ID to confirm if the instrument works normally*/
3 /*Connect the test leads under AC voltage measure mode*/
4 :function:voltage:AC /*Enable AC voltage measuring function*/
5 :measure:voltage:AC□<range> /*Set the measuring range*/
6 :calculate:function□DB /*Enable dB measuering function*/
7 :calculate:DB:reference□<value> /*Set the "dB setting" value*/
8 :calculate:DB? /*Query the measured value*/
9 /*Return value*/

The programming steps——Agilent Commands:

0 *CLS /*Clear the instrument state*/
1 cmdset□agilent /*Select Agilent commands*/
2 *IDN? /*Query equipment ID to confirm if the instrument works normally*/
3 /*Connect the test leads under AC voltage measure mode*/
4 conf:volt:ac□<range> /*Enable AC voltage measuring function and set the range*/
5 calc:stat□on /*Enable math operation function*/
6 calc:func□db /*Enable dB measurement function*/
7 calc:db:ref□<value> /*Set the "dB setting" value*/
8 calc:db:ref? /*Query the measured value*/
9 /*Return value*/

Remarks:

1. When you have set the "dB setting" value in line 7, the dB measured result will display in the screen, you can not use command to read the value.
2. The return value of line 8 command is the "dB setting", not the dB measured result.
3. Users needing a dB measured result are suggested to use **RIGOL** commands.

Example 5: P/F Test

Purpose: Use commands to perform a P/F test.
P/F operation prompts for the over range voltage signal according to upper/lower limits, and give a beep (the beeper must be on) at the same time.

The programming steps——RIGOL Commands:

0 *RST /*Reset the instrument for preparing measurement*/
1 cmdset□rigol /*Select **RIGOL** commands*/
2 *IDN? /*Query equipment ID to confirm if the instrument works normally*/
3 /*Connect the test leads under DC voltage measurement mode*/
4 :function:voltage:DC /*Enable DC voltage measuring function*/
5 :measure:voltage:DC□<range> /*Set the measuring range*/
6 :calculate:limit:lower□<value1> /*Set the lower limit*/
7 :calculate:limit:upper□<value2> /*Set the upper limit*/
8 :calculate:function□limit /*Enable limit operation function*/
9 :calculate:limit? /*Query the measuring result*/
10 /*Returned value*/
11 :calculate:function□none /*Exit calculation function*/

Remarks:

1. Before sending line 4 command , the instrument should be connected under DC voltage measure mode.
2. In line 6 and 7 commands, the parameter value2 should be greater than value1 and both of them should be within the scope of the range.
3. The return value of line 9 command is "PASS" when the input voltage is within the scope of the upper and lower limits, else "FAIL" is returned and a beep is generated (the beeper must be on) .

The programming steps——Agilent Commands:

0 *CLS /*clear the instrument state*/
1 cmdset□agilent /*Select Agilent commands*/
2 *IDN? /*Query equipment ID to confirm if the instrument works normally*/
3 /*Connect the test leads under DC voltage measure mode*/
4 conf:volt:dc□<range> /*Set the DC voltage measuring function and the range*/
5 calc:stat□on /*Enable math operation function*/
6 calc:lim:low□<value1> /*Set the lower limit*/
7 calc:lim:upp□<value2> /*Set the upper limit*/
8 calc:func□lim /*Enable limit operation function*/
9 calc:stat□OFF /*Exit math operation function*/

Remarks:

1. Before sending line 4 command , the instrument should be connected under DC voltage measure mode.
2. In line 6 and 7 commands , parameter value2 should be greater than value1 and both of them should be within the scope of the range.
3. When using line 8 command to enable limit operation function, no value is returned if the input voltage is within the scope of the upper and lower limits, else a beep is generated (the beeper must be on) and no value is returned .
4. Users needing a returned value in P/F test are suggested to use **RIGOL** commands.

Example 6: Reading Hold

"Reading Hold" function can get a stable reading and hold it on the screen even when you remove the test leads.

The programming steps——RIGOL Commands:

0 *RST /*Reset the instrument for preparing measurement*/
1 cmdset□rigol /*Select **RIGOL** commands*/
2 *IDN? /*Query equipment ID to confirm if the instrument works normally*/
3 /*Connect the test leads under DC voltage measurement mode*/
4 :function:voltage:DC /*Enable DC voltage measuring function*/
5 :measure:voltage:DC□<range> /*Set the measurement range*/
6 :trigger:auto:hold□on /*Enable reading hold function*/
7 :trigger:auto:hold:sensitivity□1 /*Set the holding range as "0.1%"*/

Remarks:

When setting the holding range in line 7 command , multiple thresholds can be set to meet different requirements (refers to the corresponding commands in chapter 3: Trigger subsystem).

Example 7: Store and Racall the Presetting

Users store current operation state (active function, range, measuring rate and so on) to the storage of DM3058, and recall the state at the next time.

The programming steps——RIGOL Commands:

```
0   *RST                          /*Reset the instrument for preparing measurement*/
1   cmdset□rigol                  /*Select RIGOL commands*/
2   *IDN?                         /*Query equipment ID to confirm if the
    instrument works normally*/
3   /*Connect the test leads under resistance measurement mode*/
4   :function:resistance          /*Enable resistance measurement function*/
5   :measure:resistance□2         /*Set the measuring range to 20 kΩ*/
6   :rate:resistance□medium       /*Set the measuring rate to medium*/
7   :calculate:function□AVERAGE   /*Enable average calculation function*/
8   *sav□1                        /*Store current state to storage area 1*/
9   :calculate:function□none      /*Exit calculation function*/
10  :function:voltage:DC          /*Enable DC voltage measuring function*/
11  :measure:voltage:DC□2         /*Set the measuring range to 20 V*/
12  :rate:voltage:DC□slow         /*Set the measuring rate to slow*/
13  :calculate:limit:lower□<value1>  /*Set the lower limit*/
14  :calculate:limit:upper□<value2>  /*Set the upper limit*/
15  :calculate:function□limit     /*Enable limit calculation function*/
16  *sav□2                        /*Store current state to storage area 2*/
17  :calculate:function□none      /*Exit calculation function*/
18  :function:frequency           /*Enable frequency measuring function*/
19  *rcl□1                        /*Recall state 1*/
20  *rcl□2                        /*Recall state 2*/
```

The programming steps——Agilent Commands:

0 *CLS /*Clear the instrument state*/
1 cmdset□agilent /*Select Agilent commands*/
2 *IDN? /*Query equipment ID to confirm if the instrument works normally*/
3 /*Connect the test leads under resistance measurement mode*/
4 conf:res□20000,2 /*Enable resistance measuring function, set range as 20 kΩ, measuring rate as medium*/
5 calc:stat□on /*Enable math operation function*/
6 calc:func□aver /*Enable average calculation function*/
7 *sav□1 /*Store current state to storage area 1*/
8 calc:stat□off /*Exit math operation function*/
9 conf□20,max /*Enable DC voltage measurement function, set range as 20V, measuring rate as low*/
10 calc:stat□on /*Enable math operation function*/
11 calc:lim:low□<value1> /*Set the lower limit*/
12 calc:lim:upp□<value2> /*Set the upper limit*/
13 calc:func□lim /*Enable limit calculation function*/
14 *sav□2 /*Store current state to storage area 2*/
15 calc:stat□off /*Exit math operation function*/
16 *rcl□1 /*Recall state 1*/
17 *rcl□2 /*Recall state 2*/

Remarks:

1. In line 4 command , input 20000 (unit is Ω), thus the range is set as 20 kΩ. The second parameter "2" denotes the resolution is 2 Ω. The resolution and the measuring rate is relevant, so the rate is set as medium.
2. In line 9 command , input 20 (or any real number between 2~20), thus the range is set as 20V. The second parameter "max" denotes the maximum resolution. The resolution and the measuring rate are relevant, so the rate is set to low.

Example 8: Query the Status Register

Users can judge current operation error by querying the status register. All the commands about the status register have been discussed in chapter 2. For RIGOL, Fluke and Agilent commands, commands about the status register are available, here we will take RIGOL commands for example.

The programming steps——RIGOL Commands:

0 *RST /*Reset the instrument for preparing measurement*/
1 cmdset□rigol /*Select **RIGOL** commands*/
2 *cls /*Clear the instrument state*/
3 status:questionable:enable□24375 /*Set the enable register of the questionable status register*/
4 status:operation:enable□1841 /*Set the enable register of the operation status register*/
5 *ESE□189 /*Set the enable register of the event status register*/
6 *SRE□188 /*Set the enable register of the status byte register*/
7 :status:questionable:enable? /*Query the enable register of the questionable status register*/
8 Return: 24375
9 :status:operation:enable? /*Query the enable register of the operation status register*/
10 Return: 1841
11 *ESE? /*Query the enable register of the event status register*/
12 Return: 189
13 *SRE? /*Query the enable register of the status byte register*/
14 Return: 188
15 :function:voltage:AC /*Enable AC voltage measuring function*/
16 *STB? /*Query the condition register of the status byte register*/
17 Return: 192
18 :status:questionable:condition? /*Query the condiction register of the questionable status register*/
19 Return: 0
20 :status:operation:condition? /*Query the condiction register of the operation status register*/
21 Return: 256
22 *ESR? /*Query the event register of the event status register*/

23 Return: 0
24 :status:questionable? /*Query the event register of the questionable status register*/
25 Return: 0
26 :status:operation? /*Query the event register of the operation status register*/
27 Return: 256
28 *cls /*Clear the status*/
29 :measure:voltage:dc? /*Enable DC voltage measuring function and measure*/
30 Return: -1.180686E+00
31 *STB?
32 Return: 0
33 :status:questionable:condition?
34 Return: 0
35 :status:operation:condition?
36 Return: 256
37 *ESR?
38 Return: 0
39 :status:questionable?
40 Return: 0
41 :status:operation?
42 Return: 272 /*Change the status and measure*/
43 *cls /*Clear the status*/
44 :trigger:single:triggered /*Execute a single trigger*/
45 *STB?
46 Return: 0
47 :status:questionable:condition?
48 Return: 0
49 :status:operation:condition?
50 Return: 256
51 *ESR?
52 Return: 0
53 :status:questionable?
54 Return: 0
55 :status:operation?
56 Return: 288

/*change the status, execute a single trigger and enter "wait to trigger" status."*/

Remarks:

1. Line 2, 28 and 43 clear current status (the value of the event status register and the error queue) of the status register. Sending the "*cls" command before a new command which is used to query the register status can clear then the interferences Existing in the register.
2. Line 3~6 set the enable register of each register. As shown in Figure 2-1, each register can be related to the status byte register.
3. Line 16, 31 and 45 query the condition register of the status byte register. This command is suggested to run before query the status register, since every time the value of the register is changed, the condition register would be updated.
4. Line 27 returns 256, it indicates the changing "event" happend; line 42 returns 272, it indicates the setting has been changed, the measurement "event" happend; line 56 returns 288, it indicates the setting has been changed, the instrument is waiting to trigger.
5. "*ESR", ":status:questionable?" and ":status:operation?" query each event register. The event register will be cleared after each time you query it.
6. The first colon ":" in ":status:operation?" command can be omited for being compatible with RIGOL and Agilent commands.

Example 9: Query the Error Information

Users can judge current operation error by querying the status register. All the commands about the status register have been discussed in chapter 2. For RIGOL, Fluke and Agilent commands, commands about the status register are available, here we will take RIGOL commands for example.

The programming steps——RIGOL Commands:

```
0   *RST                    /*Reset the instrument for preparing measurement*/
1   cmdset□rigol                    /*Select RIGOL commands*/

2   *cls                            /*Clear status*/
3   :measure?
4   :measure?                       /*Beep to alarm*/
5   SYST:ERR?
6   Return: query interrupted
7   *esr?
8   Return: 4

9   *cls
10  **cls                           /*Beep to alarm*/
11  SYST:ERR?
12  Return: synax error
13  *esr?
14  Return: 32

15  *cls
16  cmdset abc                      /*Beep to alarm*/
17  SYST:ERR?
18  Return: illegal parameter
19  *esr?
20  Return: 16

21  *cls
22  /*Read data forcibly and generat a beep*/
23  SYST:ERR?
```

24 Return: Query Unterminated
25 *esr?
26 Return: 4

27 *cls
28 :function:diode
29 :calculate:statistic:min? /*Beep to alarm*/
30 SYST:ERR?
31 Return: setting unacceptable
32 *esr?
33 Return: 8

Remarks:

1. Line 2, 9, 15, 21 and 27 clear current status (the value of the event status register and the error queue) of the status register. Sending the "*cls" command before a new command which is used to query the status register can clear then the interferences existing in the register.
2. When running line 4, 10, 16, 22 and 29 command, the beeper will alarm the current operation is error.
3. Use the "SYST:ERR?" command to query current error information.
4. Use the "*esr?" command to query the error information type (See Figure 2-1).
5. The data returned in line 4 will cover the data returned in the last time and generate a "query interrupted" error. It is a query error.
6. For line 10, when run the "*cls" command, a "*" character before the command may cause a "synax error" error. It is a syntax error.
7. For line 16, the parameters should be {RIGOL|AGILENT|FLUKE}, "abc" is invalid, so a "illegal parameter" error generates. It is a execution error.
8. For line 22, the setting command has no data returned, if read data forcibly, a "Query Unterminated" error information will generate. It is a query error.
9. Line 29 query the minimum value of the statistical data, it can not be used in continuity testing and diode measurement. Therefore, the setting is wrong, it cause the instrument can not run continuously and a "setting unacceptable" error generates. It is a device error.

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